U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-258 273

The Missouri Basin Region's Water Quality Planning Strategy Planning Dossier. Second Edition

Federal Water Quality Administration, Washington, D C

Jun 70

274175

PB 258 273

PLANNING

FWQA

THE MISSOURI BASIN REGION'S
WATER QUALITY PLANNING STRATEGY

DOSSIER

2ND EDITION JUNE 1970

FEDERAL WATER QUALITY ADMINISTRATION

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

N3

BIBLIOGRAPHIC DATA SHEET	1. Report No.	2.	3. Recipient's Accession No. PB-258 273
4. Title and Subtitle The Missouri Basin Region's Water Quality Planning Strategy. Planning Dossier. Second Edition			5. Report Date Jun 70 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address Federal Water Quality Administration, Washington, D. C.			10. Project/Task/Work Unit No. 11. Contract/Grant No.
12. Sponsoring Organization Name and Address			13. Type of Report & Period Covered 14.

15. Supplementary Notes

16. Abstracts

The Missouri Basin Region area includes the watersheds of the Missouri River and the Souris, Red River of the North, and Rainy Rivers. This area comprises all of Nebraska and North Dakota; the majority of Montana, Wyoming, South Dakota, Kansas, and Missouri; and lesser portions of Colorado, Minnesota, and Iowa. The report describes objectives, evaluation, costs, work schedule, and planning needs.

17. Key Words and Document Analysis. 17a. Descriptors

*Water pollution,
*Missouri River Basin,
Objectives,
Project planning,
Cost analysis,
Sites,
Climate,
Sources,
Water consumption,
Tables(Data),
Missouri,
Colorado,
Minnesota,
Iowa,
Nebrask,a
North Dakota,
Montana,
Wyomig,
South Dakota,
Kansas.

17b. Identifiers/Open-Ended Terms

*Water quality data.

17c. COSATI Field Group 13B

18. Availability Statement National Technical Information Service Springfield, Va. 22161	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 103p.
	20. Security Class (This Page) UNCLASSIFIED	22. Price 5.50/3.00

THE

MISSOURI BASIN REGION

- P L A N N I N G D O S S I E R -

"Strategy of quality for the
seventies to match the strategy
of quantity of the past"

--President Nixon

JUNE 1970

FORWARD

In recognition and development of short and long range work programs for comprehensive river basin planning and interagency activities, it is necessary that planning concepts, objectives, and work priorities be established and followed to the extent possible.

The goals outlined in the Planning Dossier are in essence the Region's work program. To fulfill these goals, it is, of course, essential that planning resources be matched to the planning needs commensurate with the degree of involvement established by national policy. Therefore, the Region leans heavily on the support of Headquarters for budgetary assistance and overall guidance.

TABLE OF CONTENTS

	Page
INTRODUCTION	1
AUTHORITY	3
OBJECTIVES OF THE PLANNING DOSSIER	4
DESCRIPTION OF MISSOURI BASIN REGION	6
PROBLEM AREA IDENTIFICATION PROCESS	15
EVALUATION PROCESS	17
PROBLEM AREA CHARACTERIZATIONS	28
RANKING OF PLANNING PROJECTS	82
WORK SCHEDULE	85
MAN-YEARS AND COSTS	86
BASIC PLANNING NEEDS	88
THE PLANNING APPROACH	92
APPENDIX I	

INTRODUCTION

Water pollution degrades American life which relies heavily on vast supplies of clean water for human consumption and household use, water uncontaminated for manufacturing and refining, water to raise our food, and water to maintain the country's extensive industrial complex. The free-flowing rivers and lakes of our cities are an eyesore--a further blight on the total environment. Similarly affected are scores of pristine wilderness areas, outstanding natural areas of national significance, and hundreds of recreation and tourist attractions.

In recognition of these environmental ills, a systematic management scheme has been developed that forges a strategy for the Region in meeting its water quality management responsibilities on a timely basis. The result is the Missouri Basin Region's Planning Dossier. It is a "plan for planning" which relates water pollution problems in the Region's administrative area of responsibility to their effect on the environment by homogeneous hydrologic basins. Then through a priority evaluation, a comprehensive water quality management planning program has been formulated.

In more specific terms, the Planning Dossier is designed to guide the Region in satisfying the requirements of Section 3(a) and 3(c) of the Water Pollution Control Act, providing for the preparation of comprehensive water pollution control and abatement programs through the coordinative and cooperative efforts of all levels of government and private industry. Further, it is intended to provide water quality planning direction to the coordinative efforts with the Water Resources

Council through the Missouri Basin Interagency Committee and the Souris-Red-Rainy River Basins Commission. Finally, as functional studies are initiated, they will be based in large measure on the same concepts and philosophies as expressed in the Dossier.

An integral part of the Planning Dossier is the inherent need to involve other Federal, State, and local agencies having interest and responsibilities for water quality programs. Thus, an on-going feedback procedure and integration mechanism has been built into the Dossier that will help assure that the programs outlined in this document will be totally harmonious and responsive to the objectives and goals of all concerned.

AUTHORITY

The Basic Water Pollution Control Act (PL 84-660) approved July 9, 1956, and the Federal Water Pollution Control Act Amendments (PL 87-88), approved July 20, 1961, provide for the preparation and/or development of comprehensive river basin programs under Sections 3(a) and 3(c) of the Act, as amended (33 U.S.C. 466 et. seq.).

Acts amendatory thereof or supplementary thereto include the Water Quality Act (PL 89-234) approved on October 2, 1965, and the Clean Water Restoration Act (PL 89-753) approved on November 3, 1966.

Additional comprehensive river basin planning authority emanates from the Water Resources Council through the Missouri Basin Interagency Committee (MBIAC) and the Souris-Red-Rainy River Basins Commission (SRRRBC).

OBJECTIVES OF PLANNING DOSSIER

While the overall objective of the Dossier is clean water in the Region, there are eight specific steps leading to the formulation of the planning program. Together they represent an orderly approach and the means by which to deal with our existing and potential water pollution problems. The objectives are reflected in the need to:

1. Reveal every significant water pollution problem area within the Missouri Basin Region and indicate general magnitude, location, and type of wastes.
2. Establish a priority rating system that will take into account environmental enhancement and protection desirabilities. Also, to examine all factors relating to complete problem characterization.
3. Determine priorities (or rank) based on results of an evaluation and selectivity system.
4. Delineate responsibilities pertaining to each problem, i.e., is the problem to be handled under Sections 3(a), 3(c), or interagency? This identification will in turn show relative contributions from Federal as well as State participants.
5. Provide general conceptual planning guidance for the undertaking of functional or special studies which may become necessary to "zero in" and solve a comparatively isolated or unique pollution problem.

6. Provide an informational system which will allow for integration of the Dossier's planning programs with existing and proposed activities at other levels of government as well as other Federal programs.

7. Outline the Region's short and long range work schedule of studies to be undertaken as a result of priority process outlined above. In addition, show relative costs and manpower requirements for each study through Fiscal Year 1974.

8. Outline in general terms the planning approach to be applied in undertaking a planning effort--including a standard outline that should be considered when developing the specific plan of study.

DESCRIPTION OF MISSOURI BASIN REGION

Area

The Missouri Basin Region area includes the watersheds of the Missouri River and the Souris, Red River of the North, and Rainy Rivers. This area comprises all of Nebraska and North Dakota; the majority of Montana, Wyoming, South Dakota, Kansas, and Missouri; and lesser portions of Colorado, Minnesota, and Iowa.

The Missouri River is the longest river in the United States and flows a distance of almost 2,500 miles. The headwaters of the river originate at Three Forks, Montana, and flow in a generally southeasterly course until joining with the Mississippi River a few miles above St. Louis, Missouri.

The general topography is characterized by vast rolling or gently sloping plains and prairies. The Missouri River Basin covers 340 million acres and drains an area of 529,000 square miles of the United States and Canada. The Souris, Red River of the North, and Rainy Rivers in North Dakota, South Dakota, and Minnesota add another 44,000 square miles of drainage area.

Climate

The climate of the Missouri River Basin is diverse in type, being characterized by much sunshine, wide ranges in temperature, high wind velocities, low relative humidity, and irregular annual and seasonal precipitation.

The average annual precipitation within the Missouri River Basin is 20 inches per year. Roughly 10 percent of this occurs as runoff.

The Basin also has 6 million acres of surface water, over 50 billion gallons per day (bgd) annual natural runoff, 10.5 bgd water consumption, and 5.8 bgd evaporation.

In addition to the surface supplies, which for the most part are adequate today, there exists a substantial groundwater reserve. The groundwater supply has been estimated to be 1,000,000 billion gallons or 3,000 million acre-feet. Precipitation in the northwest plains may average less than 12 inches, whereas many areas of the Lower Basin have 24-40 inches with some areas reporting over 40 inches. Droughts are not uncommon in some of the plains, and severe springtime flooding occurs frequently in most of the Lower Basin States and in the Souris-Red-Rainy areas.

In the Souris-Red-Rainy River Basins area, rainfall amounts average 14 inches in the west to 28 inches in the east. Seventy-five percent of this occurs as rainfall. Periods of severe drought as well as periods of flooding have been recorded. Temperatures for this area range from -54° to 118° F.

The Missouri River Basin is noted for extremes in temperature induced by winds, alternate cold air masses moving into the Basin from the northwest, and warm air masses from the gulf regions. The seasonal variation and even the daily range in temperature are large. All localities have experienced violent temperature changes within a few hours. Nearly all localities in the Basin have experienced summer temperatures near 100° F., and winter temperatures of -30° F. or less. Average annual temperatures range from 55° F. in the southeast to less than 40° F. in the northwest.

In 1951, an estimated $1 billion in damages was caused by the worst flood in the Region's history. The States most severely affected were Kansas and Missouri. Another major flood occurred one year later, but was primarily restricted to the Upper Basin States. It was during this period that nearly all of the record high flows for the Missouri River main stem were recorded. However, last year (1969), a flood in the Red River of the North was one of the worst recorded. Large scale preventive measures undertaken primarily by the Corps of Engineers have resulted in construction of numerous dams and reservoirs in the northern reaches of the Missouri River for the primary purpose of flow regulation.

Droughts are more common in southwestern and central areas of the Missouri River Basin than in other portions. However, the widespread drought of the 1930's affected every State in the Basin and was the cause of massive family relocation and dollar losses.

Economy

The major business activity within the Basin centers around agricultural enterprises. This "industry" accounts for roughly one-third of all employed persons within the Region. Mineral commodities also play an important function in the Region's economy and currently account for $2.5 billion annually. In addition, a substantial income is derived from the numerous tourist attractions of the Region including the Denver-Rocky Mountain National Park area, the Yellowstone National Park, and the Black Hills area of South Dakota. These and other recreation areas together with the extensive wildlife resources are expected to contribute

to a substantial increase in tourism over the years ahead.

The Missouri River Basin supports 103,789,000 acres of cropland and possesses about 25 percent of the Nation's farmland. There are 152,664,000 acres of pasture and rangeland. More than one-third of the Nation's wheat and one-third of the Nation's sugar beets are produced from this region. Almost 50 percent of the rye and flaxseed, as well as 30 percent of the Nation's acreage of corn, oats, and barley, also comes from the area. In total, 312 million acres are used for agricultural purposes with the Region.

Livestock production, a major industry, and wool sales account for over 25 percent of the national total.

Water Uses

The importance assigned to water use activities is reflected in the basic water quality planning philosophy outlined in a later section of the Dossier which focuses on environmental protection and enhancement.

Within the Missouri Basin Region, substantial participation for all full and partial body contact recreation activities currently exists. By the year 2000, the trend in these activities will reveal even greater participation patterns. Other water related activities such as hiking, camping, picnicking, and sightseeing are also increasing in popularity. Even more substantial will be the increase expected for the three major water sports--swimming, boating, and fishing--by the year 2020. The Bureau of Outdoor Recreation estimates that the combined participation in all summertime outdoor recreation activities in the year 2000 will

be four times greater than it was in 1960. Swimming will rank number one as the most popular activity in 1980 and will hold that position to the year 2000.

In Tables 1 and 2, other types of water uses are shown as well as amounts of water consumed within the Region.

TABLE 1

Present Water Uses - 1965 - Missouri Basin Region

Use	Water Withdrawn (mgd)	That Portion From Ground-water (mgd)
Irrigation	16,039	3,044
Steam-electric power	1,400	40
Municipal	969	341
Rural domestic	106	94
Self-supplied industrial	462	278
Livestock	368	208
Total	19,344	4,005

TABLE 2

Water Consumed in Missouri Basin Region - 1965

Irrigation	9,798 mgd
Livestock	355 "
Municipal	221 "
Rural domestic	85 "
Self-supplied industrial	71 "
Steam-electric power	24 "
Total	10,554 mgd

Waste Water Treatment

The treatment of wastes from municipal and industrial sources within the Region is experiencing a greater percentage of secondary treatment

with time. In 1970, it is estimated that between 85 to 90 percent of the municipalities will have sewage treatment plants with "secondary" classifications. Likewise, the degree of State, Federal, and particularly industrial treatment facilities are becoming more adequate as well as numerous. Based on 1969 State tabulations, the Missouri Basin Region possesses about 1,900 municipal sewage treatment plants, 1,000 industrial, 85 State-owned installations, and in excess of 100 Federal treatment facilities. The current combined total of 3,085 plants is up approximately 66 percent from the number of facilities that existed in 1965.

General Problems of Pollution

The causes and effects of water pollution within the Missouri Basin Region are many indeed. Although later sections of this document will identify and list specific problems, the more important can be grouped in general terms as follows: (Not necessarily in order of importance.)

1. Animal waste pollution - more than a million tons of animal wastes produced daily with an estimated waste population equivalent of 370 million.
2. Siltation - 200 million tons of silt per year cause the single most visible pollutant in the Muddy Missouri.
3. Salinity - the nondegradable pollutant from irrigation agriculture.
4. Agriculture - business pollution control.
5. Maintenance and operation of municipal waste treatment plants - inadequate design, performance, and educational training for operators are chief handicaps.

6. Eutrophication (small lakes and reservoirs) - excessive nutrients leading to accelerated aging.
7. Western Water Law - the conflict between the Prior Appropriation Doctrine and Riparian Doctrine in the Western Basin States.
8. Major metropolitan area pollution - the components of urban runoff still plaguing many metropolitan areas.
9. Funding of grants for waste treatment facilities - inadequate funding and heavy backlog of unfunded reimbursable projects.
10. Water Quality Standards refinement - need for baseline water quality data.
11. Technical data base - baseline data, manpower, and physical facilities sorely lacking.

As the situation exists today, there are also several secondary areas of concern and interest within the Region. Problems in this category can most often be isolated or occur at specific geographical locations. Included are:

12. Beet sugar production
13. Potato processing
14. Spill pollution
15. Groundwater pollution
16. Subsurface disposal by injection wells
17. Bypassing
18. Mining
19. Oil and gas production

20. Thermal pollution

21. Boat and vessel pollution

22. Development of public support

Public Base

In the development of any planning effort one of the key elements to be considered is the public base. Who is motivated, who can be motivated, who will react are essential questions but more importantly is how these interests can be factored effectively into the planning process.

The entire population is the public base in total but specific groups or interests or even individuals guide or influence public attitudes and ultimately positions on specific issues. For our purposes these interests include the various organized conservation organizations such as the Izaak Walton League, the Wildlife Federation, the Audobon Society, et. al.; the watchdog groups such as the League of Women's Voters and even the Legal Aid Society or its counterparts. The special interest groups such as the various farmer organizations - FFA, the Grange, 4H, Soil Conservation Societies, Feeder and Cattlemen's Associations, etc., etc., the youth groups on and off campus; special interest area recreation or redevelopment citizen committees; church attitudes where they seem relevent, professional groups and individuals such as AWWA, WPCF, ASCE, respected consultants, etc., the various State and Federal agencies having public base influence, the entire spectrum of the news media, and so forth.

The calculated effort to recognize those various views and influences as part of an organized program to build acceptance of a proposed water quality management plan for the area under consideration will in large part determine the measure of success and the degree of implementation effected by those elements making up the decision base.

Decision Base

The Decision Base can also be equated to the Political Base. These people or organizations are the implementeas of public, industrial and agricultural policy. They can turn the key so to speak to make programs go or conversely to prevent actions being taken. A complete understanding of the infrastructure of the decision base for an area must be developed so that the influence of the public base and information developed in the technical base can be used to the best advantage. The elected officials in local and State government, the policy implementing local and State agencies, the key person or people -- though not in elective or appointive positions -- who can motivate the public figures to action, the industrial decision makers, whether it is the plant engineer, superintendent, comptroller, etc. are all part of the decision base category.

Both the public and decision bases have been considered in the past, but too often essential elements have been missed. The process has been more intuitive than calculated. We have stressed the technical aspects in planning with only marginal consideration as to public acceptability and political action. This Dossier takes full cognizance of the vital nature of these bases.

PROBLEM AREA IDENTIFICATION PROCESS

In determining specific problem areas, State program plans were utilized to determine past, present, and future pollution problems, studies, and abatement actions. In addition, special projects or undertakings relating to water pollution abatement currently on-going or to be conducted by the State were investigated to see if possible integration with Section 3(c) financial assistance or Section 3(a) involvement could be effected. A list of the top 22 problems within the Missouri Basin Region was also used. In addition, a more recently prepared list of the "immediate needs" in terms of pollution problems and effects was reviewed and worked into the Dossier's problem area identification.

The preliminary findings of the two groups responsible for developing comprehensive river basin planning Type I and Type II studies in the Region (the Missouri Basin Interagency Committee and the Souris-Red-Rainy River Basins Commission) were also utilized.

After a thorough investigation within FWPCA was made, several States within the Basin were contacted to further expand and define known pollution problem areas. Of primary interest in this phase was the information gained from the State planning agencies. Because they are chiefly responsible for all planning at the State level, their knowledge of known pollution problems and further growth and development patterns was particularly useful. In addition, State agencies such as the State water pollution control agency, Board of Health, Department of Fish

and Wildlife, Department of Water Resources, and various Departments of Recreation provided additional inputs. In some instances, previously unidentified problems were brought to the surface by these State representatives. The problems were in turn examined relative to all others.

The means by which the States and Federal Government reach agreement on acceptable levels of water quality are expressed in the Water Quality Standards. The Standards represent the water quality levels not only desired for future years, but also include the quality levels that must be maintained in order to assure continued beneficial use of the particular streams. In this regard, the Standards act as basic guidelines or parameters.

The purpose of the Standards is to enhance the quality and value of our water resources and to establish an effective program for the prevention, control, and abatement of water pollution.

As a part of the problem area identification process, the current status of Water Quality Standards for the Basin States was reviewed. Those States that had Standards approved but with exceptions were noted. Likewise, the interstate streams not in compliance with existing Standards were listed. The result was an awareness of specific pollution problems and areas; information later used in the Problem Area Characterization Section.

My Philosophy Of Conservation

..."We must protect the streams and lakes that still are clean. And we must improve the quality of many polluted waters."

..."Our aim should be prevention instead of reaction to deterioration in the environment."

Walter J. Hickel
July 1969

..."The philosophy that stresses environmental protection is particularily applicable to the Missouri River Basin Region where industrialization is sparce and urbanization is light."

..."It is to these major tasks--environmental protection and enhancement--that we have assigned ourselves in this effort."

John M. Rademacher
September 1969

Regional Philosophy

In the identification and evaluation of pollution problem areas within the Missouri Basin Region, a rather basic philosophy is employed. It is in each instance to see how a particular area relates to the desirability for environmental protection or enhancement. In a realistic sense, the Dossier identifies two distinct types of river basin planning activities--those that reflect the need to protect and those that reflect the need to enhance.

It is noteworthy to point out that the term protection is synonymous to preserving or prevention. This does not mean that some improvement or enhancement of the existing water quality may not occur within a given drainage area or subbasin. Likewise, the word enhance as implied herein means some level of pollution elimination or reduction, but does not disallow some degree of environmental protection in a given study area.

The relationship of desirability levels for environmental protection and enhancement to levels of water use and pollution problem are illustrated in Figure 1. Shown is the central theory of the Dossier. It identifies five zones of environmental protection and enhancement desirability. The five orders shown relate to an index rating which is used in the evaluation and selectivity system to follow later.

The Zone of Mandatory Protection is found in the lower right-hand corner of the triangle found in Figure 1. As shown, where pollution levels are low and stream use is high, there develops an increasing

need to "protect" the resource. The logic here implies that those waters now pristine must be protected through adequate planning because once the pollution skid has started, those waters may be "environmentally lost" forever. In this zone, the greater the resource use, the greater the desirability for environmental protection.

On the other hand, where pollution levels and problems are high and stream use is down, the Zone of Mandatory Enhancement is found. Figure 1 shows that increased pollution loads are typically accompanied by decreased stream use and thereby dictate a higher necessity for environmental enhancement, i.e., the higher the pollution, the greater the enhancement desirability.

The third zone in the triangle circumscribes a marginal set of environmental conditions. Generally, it is restricted to pollution loadings of less than a 50 rating on the scale and beneficial uses of less than 40. This zone is considered to be somewhat removed from the main stream of importance because the related environmental factors do not dictate immediate action or corrective measures. Within this zone, the least important area of all is found. It is the area that displays less than a 10 rating for pollution severity and less than a 10 value for beneficial stream use. In the water quality planning approach, these areas are and will continue to be of a sterile nature with regards to increased future benefits, should any planning studies be undertaken.

One additional point of interest might be expressed; that is, our pristine waters are normally situated in the upper watersheds. The

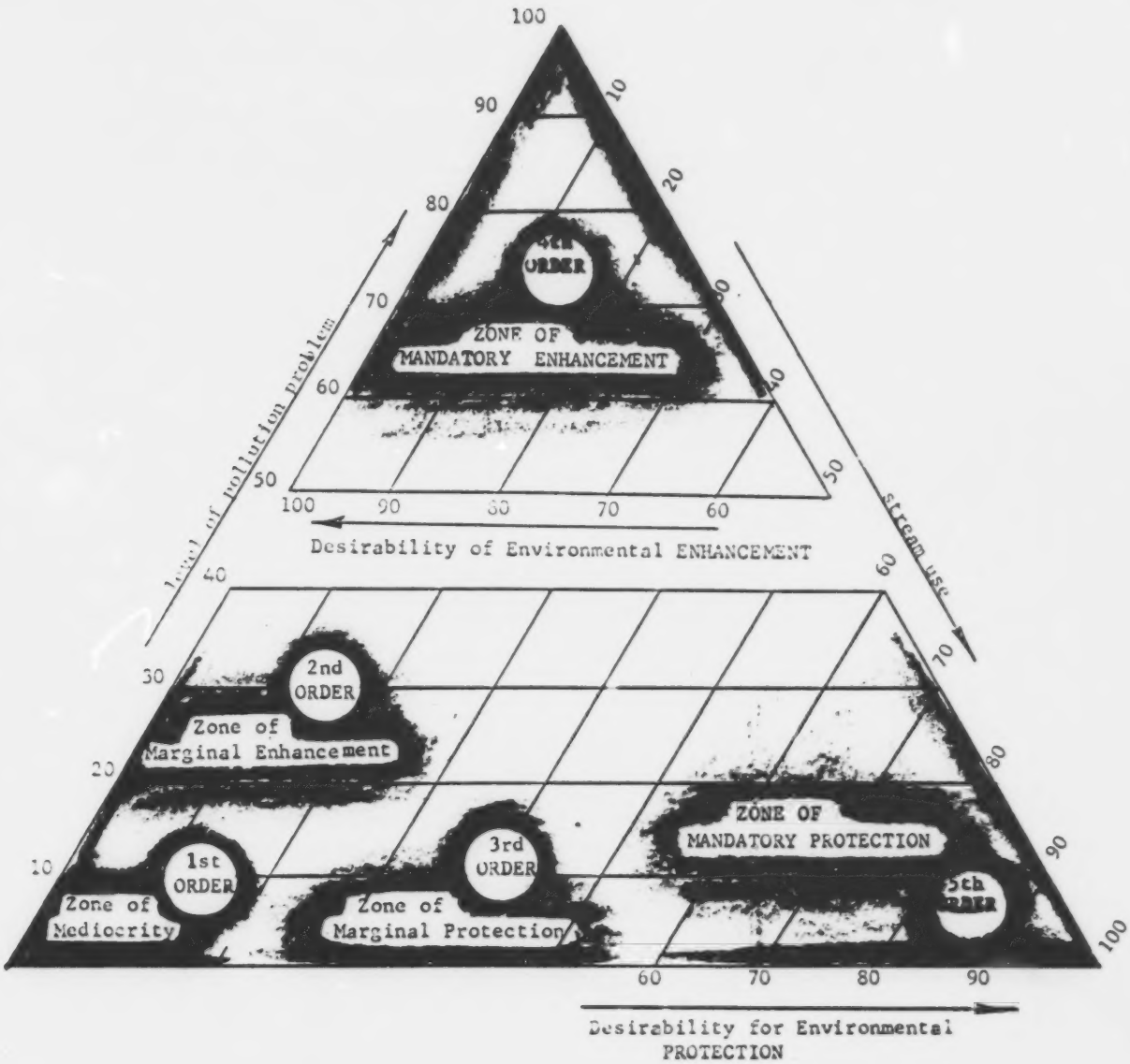


FIGURE 1 Environmental Conditions and Protection Desirabilities

In reading from left to right, it can be seen that with increasing pollution there is generally less stream use. Upon following the lines downward, the desirability levels for environmental enhancement and protection are shown. Use as described here refers to those uses that are desirable from an environmental standpoint and that are associated with a quality of experience. These include: swimming, wading, boating, canoeing, sailing, fishing, sightseeing, hiking, picnicking, esthetics, etc.

planning program thus would dictate preservation, and after secured, the planning program would lean towards enhancement in the lower watersheds. In theory, this makes sense as regardless of the effort of pollution control in lower watersheds the upper watersheds will still dictate water quality flowing through the lower watershed area.

The explanation of the orders (1-5) will be discussed in a later section dealing with the environmental multiplier index.

The Evaluation and Selectivity System

The evaluation and selectivity system is shown in illustrative form in Figure 2. (The environmental multiplier index also reflected in this figure will be described in the following paragraphs.)

In the evaluation process for each problem area, all pertinent factors that could influence the rating of a study area were reviewed. The system used was based on the grouping of similar factors into three major sections: a problem section; a water use section; and a practical section. Numerical values for each of the factors within the sections were assigned. All of the values were then added, yielding a summation total. The last step of the system involved an environmental multiplier index number. In this step, which is based on the regional philosophy or the triangle previously described, the summation total was multiplied by an index number between 1 and 5 which lead to the final priority rating of the problem area. The value thereby attained was subsequently used to rank all of the problem areas against one another.

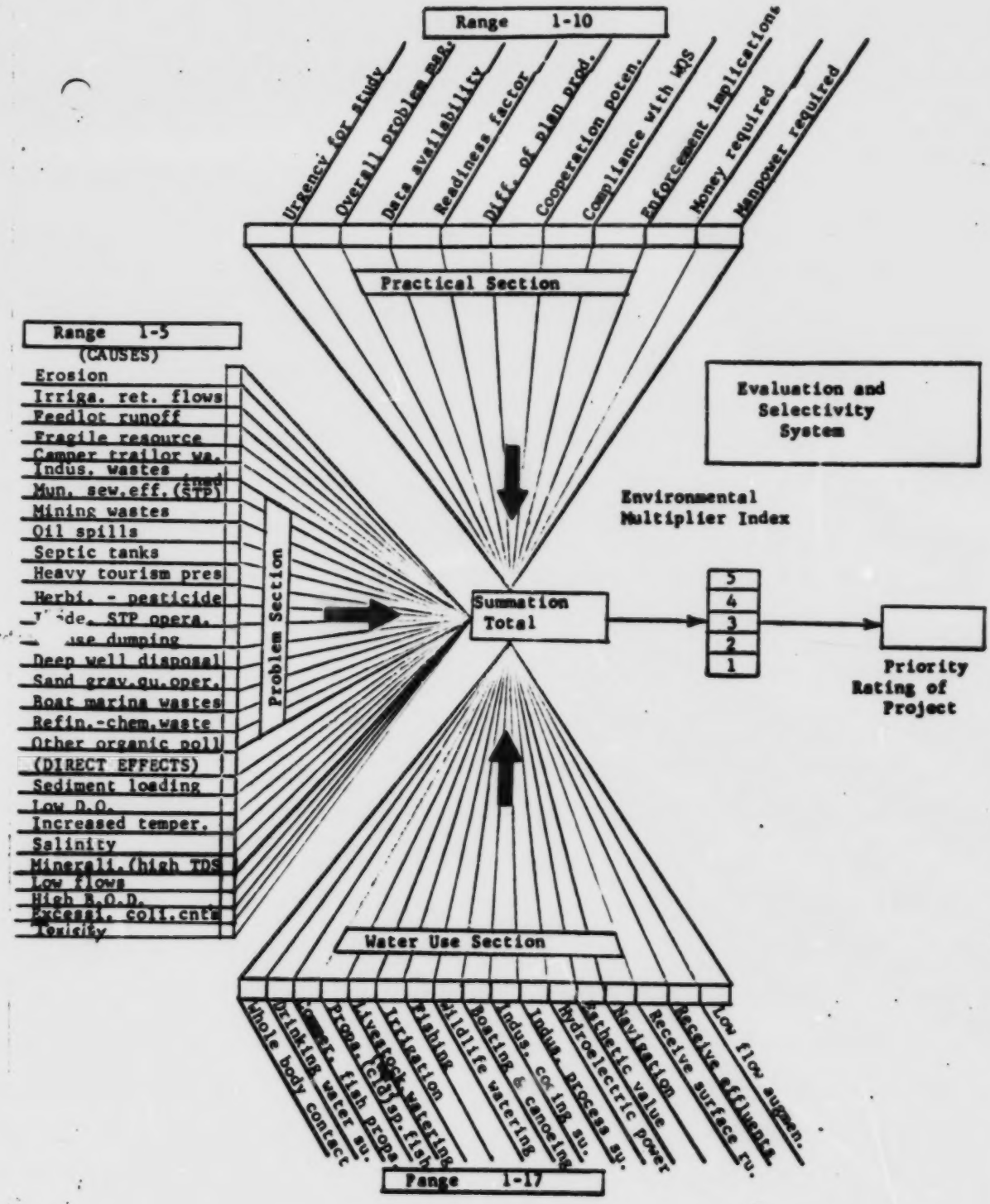

Range 1-10
Urgency for study
Overall problem mgt.
Data availability
Readiness factor
Diff. of plan prod.
Cooperation poten.
Compliance with WQS
Enforcement implications
Money required
Manpower required
Practical Section
Range 1-5
(CAUSES)
Erosion
Irriga. ret. flows
Feedlot runoff
Fragile resource
Camper trailor wa.
Indus. wastes
Mun. sew.eff.(STP)
Mining wastes
Oil spills
Septic tanks
Heavy tourism pres
Herbi. - pesticide
Deep well disposal
Sand gray.qu.oper.
Boat marina wastes
Refin.-chem.waste
Other organic poll
(DIRECT EFFECTS)
Sediment loading
Low D.O.
Increased temper.
Salinity
Minerali.(high TDS
Low flows
High B.O.D.
Excessi. coli.cnts
Toxicity
Problem Section
Evaluation and Selectivity System
Environmental Multiplier Index
Summation Total
5
4
3
2
1
Priority Rating of Project
Water Use Section
Whole body contact
Drinking water su.
Propa. fish prope
Irrigation
Fishing
Wildlife watering
Boating & canoeing
Indus. cooling su.
Indus. process su.
Hydroelectric power
Aesthetic value
Navigation
Receive surface wa.
Receive effluents
Low flow augmen.
Range 1-17

Figure 2

Problem Section

The result of the problem area identification process described earlier forms the basis for the water pollution problem section. Here, in excess of 25 problems within the Missouri Basin Region have been identified and listed. This is not to establish adequacy or "completeness" of the list, but only to point out the most important and reoccurring problems. Since many of the problems are interrelated and exemplify a cause-effect relationship, they are illustrated as such. Note that only direct effects have been listed. Indirect effects such as resulting ecological imbalance of the biotic community or restriction of water uses are not amenable to this rating procedure. Moreover, some of the terms may appear to be synonomous to one another. This is due to the terminology used by the various sources for the information. Where this has occurred, precaution was taken in the filling out of the evaluation forms not to "double count" a particular problem.

The numerical range for this section is from 1 to 5. The greater the severity or magnitude of the problem, the higher the value assigned.

Water Use Section

This section lists 17 recognized stream uses that are applicable to all interstate and intrastate waters within the Missouri Basin Region. The uses were derived from each of the States' Water Quality Standards classifications for the streams in question. Not all of the uses were recognized in every State and some States preferred an aggregate listing instead, i.e., the use of the word recreation for example rather than differentiating among fishing, boating, canoeing, wading, etc. Because

the various streams possessed different priorities of stream use, different values were assigned accordingly.

Practical Section

This section is an assembly of heterogeneous factors concerning such items as data availability, manpower requirements, readiness, and urgency for study. In general, this section brings together all those factors that as a group take into account the feasibility, need, and socio-economic aspects of undertaking a particular study. The numerical range of values is from 1 to 10. The following are offered as examples:

Urgency for study - if there is immediate urgency, a value of 10 is assigned. Little or no urgency would receive a value of 1 or 2.

Overall problem magnitude - those problems of greatest magnitude are assigned values of 9 or 10.

Data availability - where data is not readily available or extensive field work is required, a value of from 1 to 4 is given.

Readiness factor - how soon could a particular study be initiated? If immediately or soon, a correspondingly high value (7-10) is used.

Difficulty of plan production - if numerous unknowns and difficulties are expected, the values assigned here will be low (1-4).

Cooperation potential - a value of 9 or 10 indicates that cooperation is readily available, desirable, and necessary.

Compliance with Water Quality Standards - if one or more streams in the study area are not in compliance with the existing Water Quality Standards, correspondingly high values will be assigned. If no conflicts exist or are expected with the Standards, values of 1 to 4 are assigned.

Enforcement implications - if the probability of enforcement action is high on streams or portions thereof as a result of noncompliance with the Standards, values of 7 or above are used.

Money required - a study that would require extensive manpower is given a low numerical rating.

Thus, it can be seen that a considerable amount of judgment value goes into affixing a rating. While this process may be open to error, it is still felt to be the best process that could be developed under existing conditions.

Although the Dossier will list and rank every significant water pollution problem area in the Missouri Basin Region, the document will attempt to remain flexible insofar as its ranking of planning projects. Priorities may change as the variables that comprise the rating system are altered.

Environmental Multiplier Index (EMI)

This step in the evaluation process is the most heavily weighted and most important.

There are five orders in the EMI and these relate to various levels of environmental protection and enhancement. The highest order (5th) refers to the Zone of Mandatory Protection, while the second most significant order (4th) identifies the Zone of Mandatory Enhancement. These as well as the remaining zones are further identified and defined on the following page.

The EMI value and definition that best "fits" a problem area is selected. The summation total is then multiplied by an appropriate EMI

value which in turn produces a priority rating number for a given problem area. The values thus obtained are used to finally rank the individual areas. This is the end result of the systems evaluation process.

The system, as outlined, will produce results that minimize value judgments where possible, inject a degree of objectivity, and take into account all those factors related to the water pollution problems within the Missouri Basin Region.

ENVIRONMENTAL MULTIPLIER INDEX

Orders of Environmental Desirability:[1/]

5th ORDER — Zone of Mandatory Protection

Those streams and areas that have low levels of pollution and high use.

4th ORDER — Zone of Mandatory Enhancement

Those streams and areas that have high levels of pollution and little use.

3rd ORDER — Zone of Marginal Protection

Those streams and areas that display a single or minor pollution load but still experience moderate use.

2nd ORDER — Zone of Marginal Enhancement

Those streams and areas that display moderate pollution and as a result experience little use.

1st ORDER — Zone of Mediocrity

Those streams and areas that display insignificant pollution and inconsequential use.

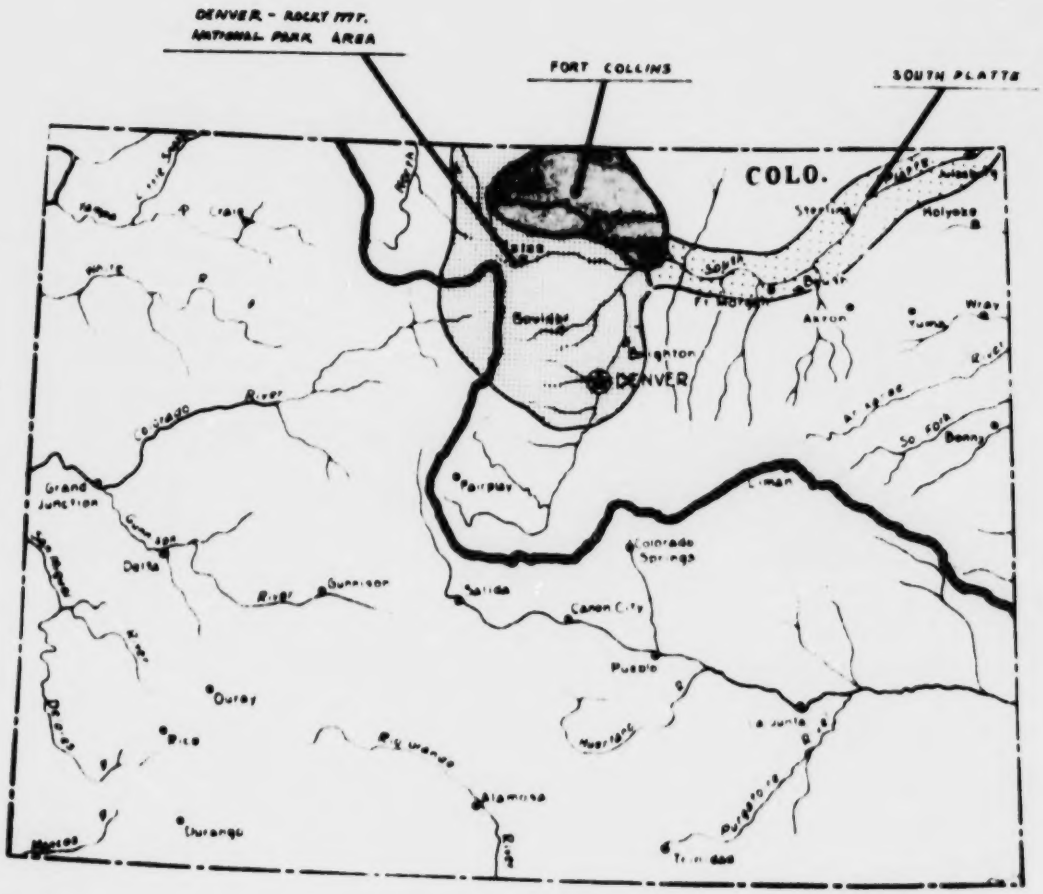
1/ Use, as described here, again refers to those uses that are desirable from an environmental standpoint and that are associated with a quality of experience. These include: swimming, wading, boating, canoeing, sailing, fishing, sightseeing, hiking, picnicking, esthetics, etc.

PROBLEM AREA CHARACTERIZATIONS

In order to utilize the procedures outlined in the evaluation and selectivity system, a form is employed whereby the various problems, water uses, and practical considerations are listed and totaled. Each problem area in the Region is evaluated through the use of the form and a priority number indicating relative importance is thereby attainable. Although, it is obvious that the majority of areas identified possess streams that cross State boundaries, only one form will be shown for the interstate streams and will be listed under the State possessing the longest stream reach.

Additional clarification is required for the "Water Uses" portion of the form. First of all, each of the uses are derived from and based upon criteria set in the States' Water Quality Standards. Whole body contact includes this type of activity on existing stream reservoirs and impoundments. The second use, drinking water supply, may include municipal and rural domestic supply as well as those industries connected to municipal systems. The final point of clarification concerns industrial cooling supply; the term includes water used for steam-electric power generating plants.

COLORADO


DENVER - ROCKY MTN.
NATIONAL PARK AREA
FORT COLLINS
SOUTH PLATTE
COLO.
DENVER
Colorado River
Grand Junction
Durango

Denver - Rocky Mtn. Nat. Park Area

PROJECT TITLE

RIVER BASIN	North-South Platte
STATE(S)	Colorado - Wyoming
PROBABLE STUDY SECTION	3(a) & (c)

PROBLEMS Type	Range (1-5)	
a.	heavy tourism pressure	5
b.	camper trailer wastes	5
c.	industrial waste discharges	5
d.	irrigation return flows	4
e.	salinity	4
f.	sedimentation - erosion	4
g.	inadequate STP operations	3
h.	feedlot runoff	3
i.	deep well disposal activities	2
j.	oil waste & mine drainage	2

SUB TOTAL 37

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	15
Propagation of warm and/or cold water sport fish	14
Livestock watering	8
Irrigation	9
Fishing	11
Wildlife watering	13
Boating and canoeing	10
Industrial cooling supply	6
Industrial process supply	7
Hydroelectric power	5
Aesthetic value	12
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 148

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	10	Cooperation potential	8
Overall problem magnitude	10	Compliance with Water Quality Standards	5
Data availability	9	Enforcement implications	4
Readiness factor	10	Money required	6
Difficulty of plan production	8	Manpower required	7
		Other	

SUB TOTAL 77

SUMMATION TOTAL	262
EMI VALUE	4
PRIORITY RATING NUMBER	1048

South Platte

PROJECT TITLE

RIVER BASIN . . . . . Platte
STATE(S) . . . . . Colorado-Nebraska
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type	Range (1-5)		
a.	sedimentation-erosion	5	
b.	industrial waste discharges	5	
c.	low flows	5	
d.	salinity	4	
e.	total dissolved solids	4	
f.	irrigation return flows	4	
g.	camper trailor wastes	4	
h.	inadequate STP operation	3	
i.	municipal STP (combined sewers)	3	
j.	feedlot runoff	3	
k.	mine drainage	2	
l.	oil wastes and spills	2	SUB TOTAL 44

WATER USES	Range (1-17)	
Whole Body contact	17	
Drinking water supply	16	
Commercial fish propagation		
Propagation of warm and/or cold water sport fish	14	
Livestock watering	12	
Irrigation	11	
Fishing	10	
Wildlife watering	13	
Boating and canoeing	9	
Industrial cooling supply	7	
Industrial process supply	8	
Hydroelectric power	6	
Aesthetic value	5	
Navigation	4	
Receive surface runoff	3	
Receive effluents	2	
Low flow augmentation		SUB TOTAL 137

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	9	Cooperation potential	5
Overall problem magnitude	10	Compliance with Water Quality Standards	8
Data availability	8	Enforcement implications	8
Readiness factor	4	Money required	3
Difficulty of plan production	3	Manpower required	3
		Other	SUB TOTAL 62

SUMMATION TOTAL 242

EMI VALUE 4

PRIORITY RATING NUMBER 968

Fort Collins

PROJECT TITLE

RIVER BASIN . . . . . Cache La Poudre
STATE(S) . . . . . Colorado
PROBABLE STUDY SECTION . . . . . 3(c)

PROBLEMS Type	Range (1-5)	
a.	inadequate STP	4
b.	irrigation return flows	3
c.	industrial waste discharges	3
d.	feedlot runoff	2
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 12

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	15
Livestock watering	11
Irrigation	10
Fishing	13
Wildlife watering	14
Boating and canoeing	12
Industrial cooling supply	
Industrial process supply	8
Hydroelectric power	6
Aesthetic value	5
Navigation	
Receive surface runoff	1
Receive effluents	2
Low flow augmentation	

SUB TOTAL 115

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	3	Cooperation potential	6
Overall problem magnitude	4	Compliance with Water Quality Standards	2
Data availability	2	Enforcement implications	2
Readiness factor	2	Money required	3
Difficulty of plan production	5	Manpower required	2
		Other	

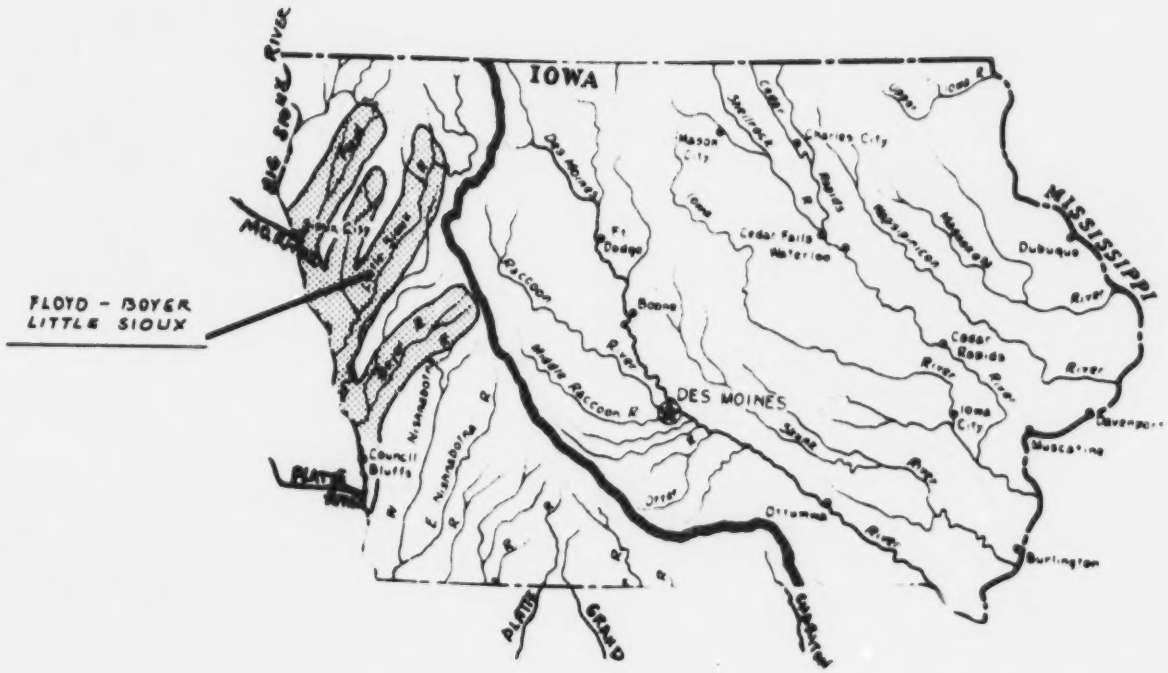
SUB TOTAL 31

SUMMATION TOTAL 158

EMI VALUE 2

PRIORITY RATING NUMBER 316

IOWA


IOWA
BIG SIOUX River
FLOYD - BOYER
LITTLE SIOUX
MISSISSIPPI
DES MOINES
Council Bluffs
PLATTE
GRAND

Floyd - Boyer - Little Sioux

PROJECT TITLE

RIVER BASIN . . . . . Middle Mo.
STATE(S) . . . . . Iowa
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	sedimentation - erosion	5
b.	low flows	5
c.	feedlot runoff	5
d.	inadequate STP operation	5
e.	municipal waste discharges	4
f.	herbicides - pesticides	3
g.	meat packing wastes	3
h.	industrial waste discharges	3
i.	toxicity	2
j.		

SUB TOTAL 35

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	13
Livestock watering	8
Irrigation	9
Fishing	
Wildlife watering	10
Boating and canoeing	
Industrial cooling supply	6
Industrial process supply	7
Hydroelectric power	
Aesthetic value	4
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 62

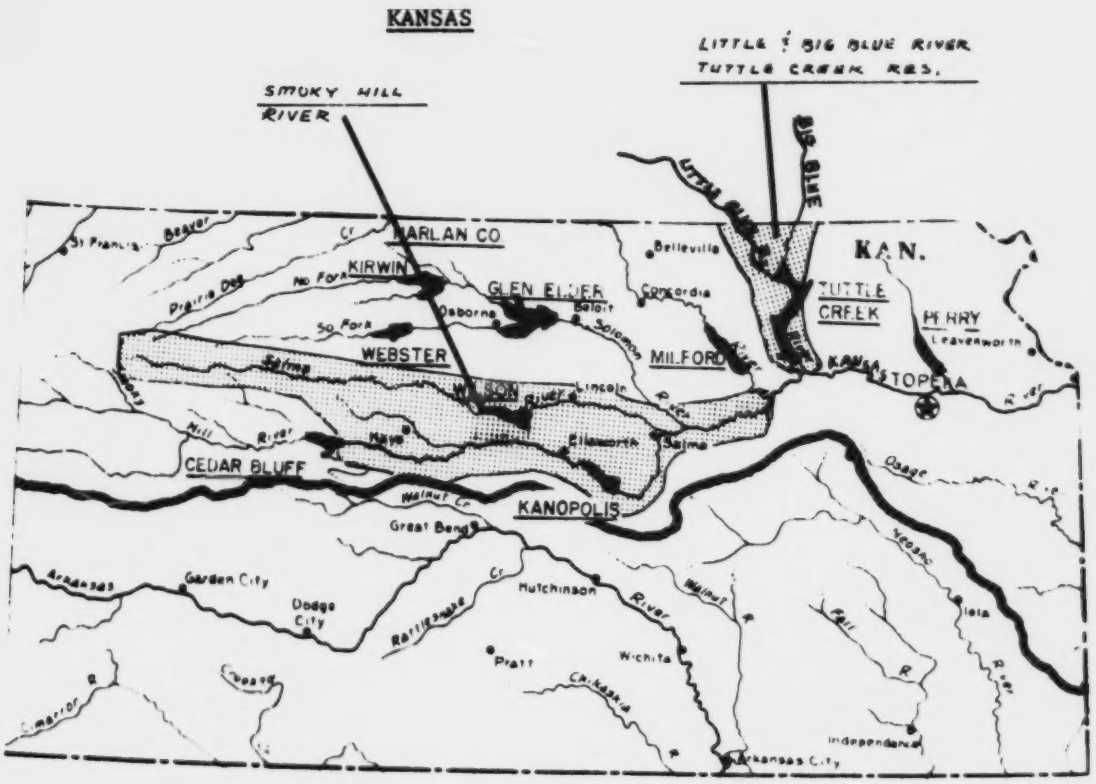
PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	7	Cooperation potential	1
Overall problem magnitude	9	Compliance with Water Quality Standards	7
Data availability	5	Enforcement implications	6
Readiness factor	3	Money required	6
Difficulty of plan production	5	Manpower required	5
		Other	

SUB TOTAL 54

SUMMATION TOTAL 151

EMI VALUE 4

PRIORITY RATING NUMBER 604


KANSAS
SMOKY HILL RIVER
LITTLE & BIG BLUE RIVER
TUTTLE CREEK RES.
BIG BLUE
LITTLE BLUE
HARLAN CO
KIRWIN
GLEN ELDER
Osborne
Solomon
Belleville
Concordia
KAN.
TUTTLE CREEK
PERRY
Leavenworth
MILFORD
WEBSTER
Salina
Lincoln
Ellsworth
TOPEKA
CEDAR BLUFF
KANOPOLIS
Great Bend
Garden City
Dodge City
Hutchinson
Pratt
Wichita
Arkansas City
Independence
Iola
Osage
Neosho
Walnut
Rattlesnake
Cimarron
Cheyenne
Prairie Dog
Beaver
Mill
Saline
Smoky
Solomon
Republican
Kansas

Smoky Hill River

PROJECT TITLE

RIVER BASIN . . . . . Smoky Hill
STATE(S) . . . . . Kansas
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.		
b.	high TDS	5
c.	irrigation return flows	5
d.	future water supply	3
e.	low flow augmentation	3
f.	municipal waste treatment	2
g.	nutrients	1
h.	sand - gravel - quarry operations	1
i.		
j.		

SUB TOTAL 20

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	15
Livestock watering	9
Irrigation	10
Fishing	8
Wildlife watering	14
Boating and canoeing	5
Industrial cooling supply	6
Industrial process supply	7
Hydroelectric power	
Aesthetic value	4
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	1

SUB TOTAL 117

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	5	Cooperation potential	5
Overall problem magnitude	6	Compliance with Water Quality Standards	4
Data availability	8	Enforcement implications	2
Readiness factor	7	Money required	6
Difficulty of plan production	8	Manpower required	7
		Other	

SUB TOTAL 52

SUMMATION TOTAL 194

EMI VALUE 2

PRIORITY RATING NUMBER 388

Little and Big Blue River-Tuttle Creek Res.

PROJECT TITLE

RIVER BASIN . . . . . Blue River
STATE(S) . . . . . Kansas-Nebraska
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	recreation pressure	4
b.	feedlot runoff	3
c.	municipal wastes	2
d.	sand-gravel-quarry operations	2
e.	low flows	1
f.	nutrients	1
g.		
h.		
i.		
j.		

SUB TOTAL 13

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	11
Irrigation	12
Fishing	10
Wildlife watering	13
Boating and canoeing	5
Industrial cooling supply	6
Industrial process supply	8
Hydroelectric power	
Aesthetic value	9
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 126

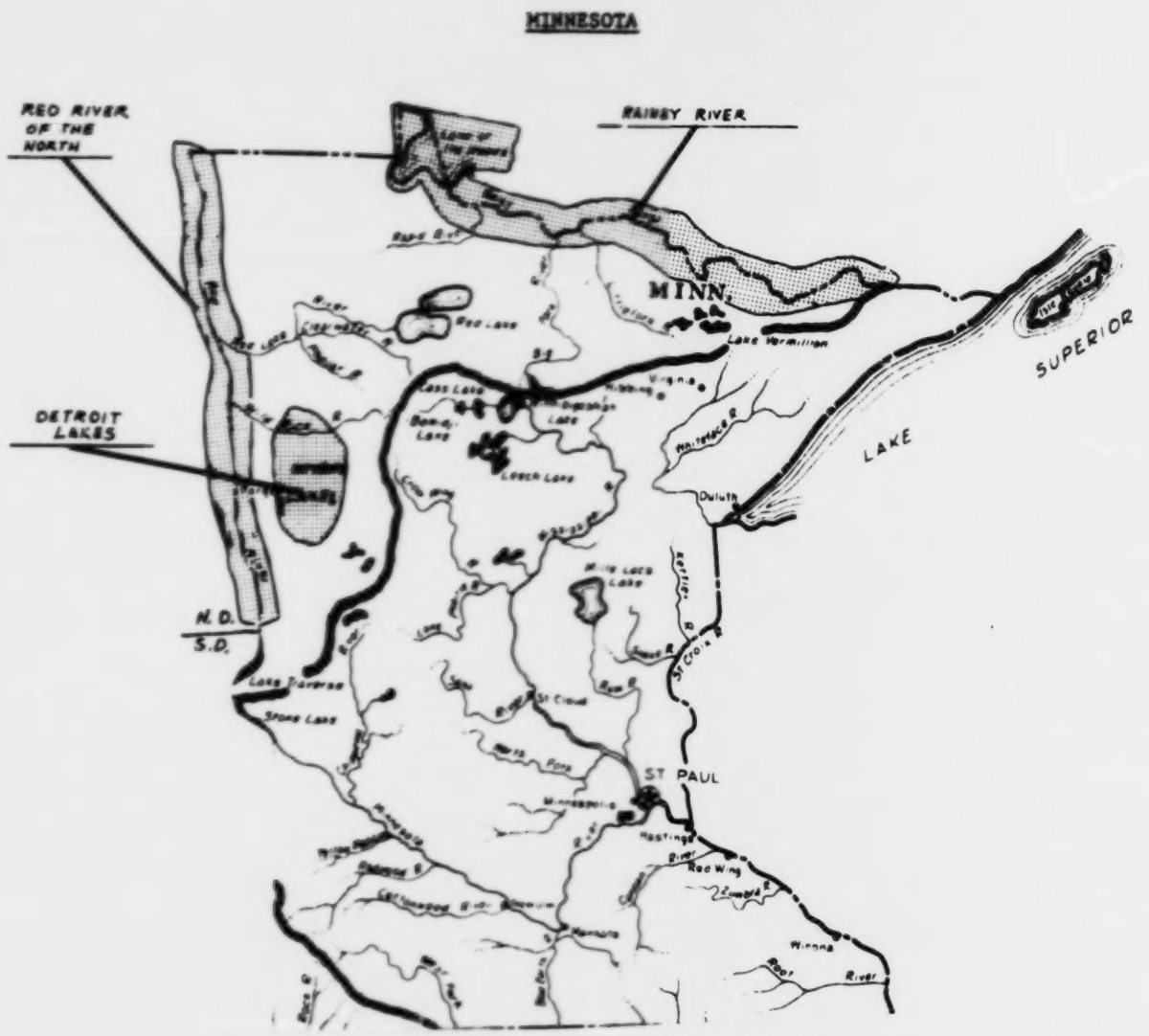
PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	6	Cooperation potential	5
Overall problem magnitude	4	Compliance with Water Quality Standards	3
Data availability	5	Enforcement implications	2
Readiness factor	4	Money required	3
Difficulty of plan production	5	Manpower required	2
		Other	

SUB TOTAL 39

SUMMATION TOTAL 178

EMI VALUE 2

PRIORITY RATING NUMBER 356


MINNESOTA
RED RIVER OF THE NORTH
RAINY RIVER
DETROIT LAKES
MINN.
Lake Vermilion
SUPERIOR
LAKE
Duluth
N.D.
S.D.
ST PAUL

Red River of the North

PROJECT TITLE

RIVER BASIN . . . . . Red River
STATE(S) . . . . . Minnesota - North Dakota
PROBABLE STUDY SECTION . . . . . 3 (a)

PROBLEMS Type		Range (1-5)
a.	sugar beet plant effluent	5
b.	potato plant effluent	5
c.	industrial waste discharges	4
d.	excessive coliform	4
e.	mineralization (surface water)	3
f.	inadequate STP operation	3
g.	irrigation return flows	2
h.	low D.O. (winter ice cover)	2
i.		
j.		

SUB TOTAL 28

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	14
Propagation of warm and/or cold water sport fish	15
Livestock watering	8
Irrigation	9
Fishing	12
Wildlife watering	13
Boating and canoeing	10
Industrial cooling supply	6
Industrial process supply	7
Hydroelectric power	
Aesthetic value	11
Navigation	4
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 130

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	8	Cooperation potential	5
Overall problem magnitude	7	Compliance with Water Quality Standards	4
Data availability	9	Enforcement implications	3
Readiness factor	8	Money required	6
Difficulty of plan production	8	Manpower required	7
		Other	

SUB TOTAL 68

SUMMATION TOTAL 226

EMI VALUE 4

PRIORITY RATING NUMBER 904

Rainy River

PROJECT TITLE

RIVER BASIN . . . . . Lake of the Woods
STATE(S) . . . . . Minnesota-Canada
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	pulp mill discharges	5
b.	heavy recreation pressure	4
c.	industrial waste discharges (milk processing)	4
d.	fragile resource	4
e.	mining operations	3
f.	inadequate STP	2
g.	municipal waste discharges	1
h.		
i.		
j.		

SUB TOTAL 23

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	15
Propagation of warm and/or cold water sport fish	14
Livestock watering	11
Irrigation	10
Fishing	9
Wildlife watering	13
Boating and canoeing	8
Industrial cooling supply	6
Industrial process supply	7
Hydroelectric power	
Aesthetic value	12
Navigation	4
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 147

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	10	Cooperation potential	6
Overall problem magnitude	9	Compliance with Water Quality Standards	4
Data availability	6	Enforcement implications	3
Readiness factor	5	Money required	6
Difficulty of plan production	5	Manpower required	6
		Other	

SUB TOTAL 60

SUMMATION TOTAL 230

EMI VALUE 4

PRIORITY RATING NUMBER 920

Detroit Lakes

PROJECT TITLE

RIVER BASIN . . . . . Red River
STATE(S) . . . . . Minnesota
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	heavy recreation pressure	5
b.	eutrophication	4
c.	nutrients	3
d.	inadequate STP	2
e.	septic tanks	1
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 15

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	7
Irrigation	8
Fishing	10
Wildlife watering	12
Boating and canoeing	9
Industrial cooling supply	
Industrial process supply	
Hydroelectric power	
Aesthetic value	13
Navigation	
Receive surface runoff	3
Receive effluents	
Low flow augmentation	

SUB TOTAL 104

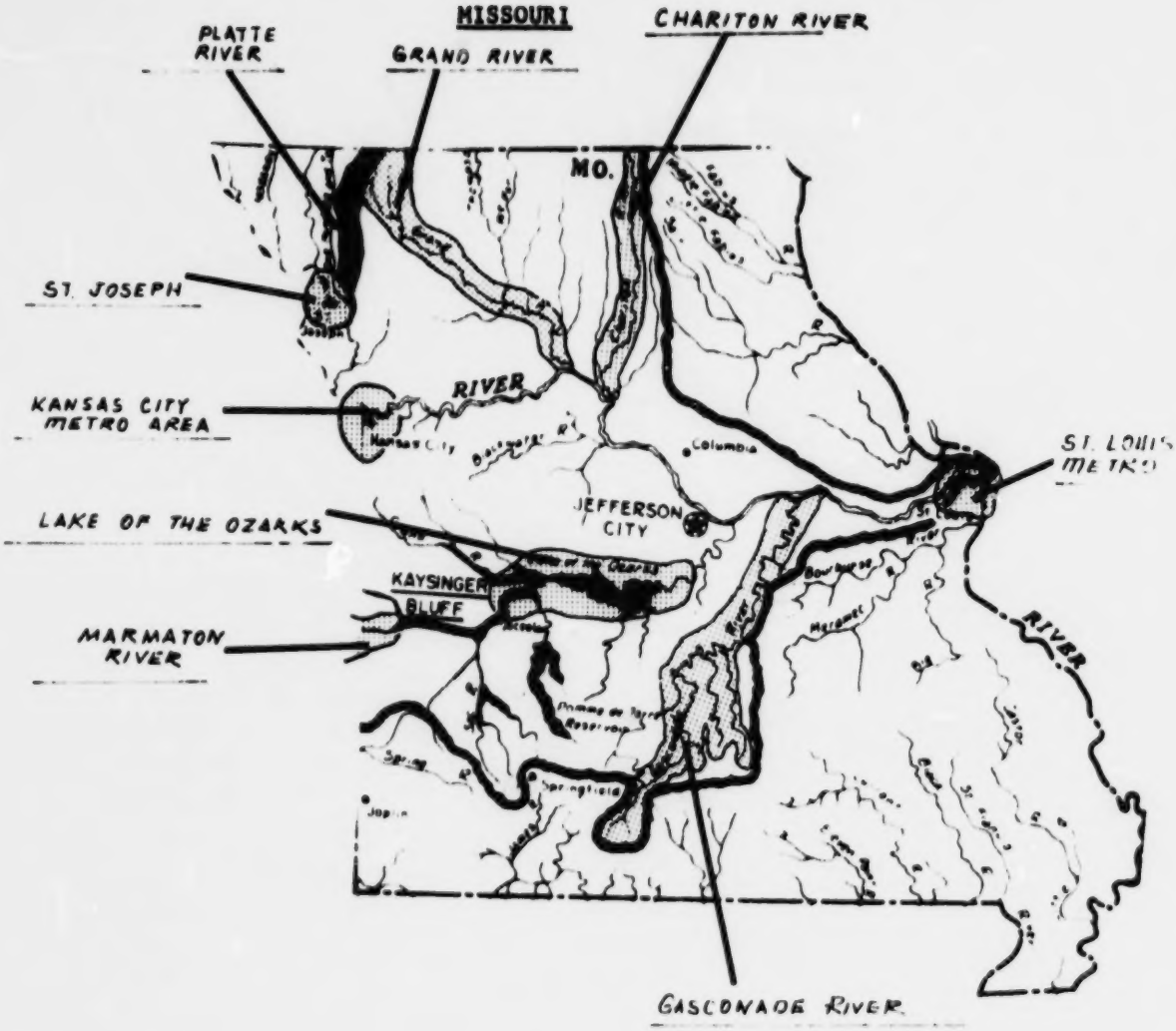
PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	7	Cooperation potential	7
Overall problem magnitude	4	Compliance with Water Quality Standards	2
Data availability	3	Enforcement implications	1
Readiness factor	4	Money required	4
Difficulty of plan production	5	Manpower required	2
		Other	

SUB TOTAL 32

SUMMATION TOTAL 163

EMI VALUE 5

PRIORITY RATING NUMBER 815


MISSOURI
PLATTE RIVER
GRAND RIVER
CHARITON RIVER
MO.
ST. JOSEPH
KANSAS CITY METRO AREA
RIVER
Columbia
JEFFERSON CITY
LAKE OF THE OZARKS
KAYSINGER BLUFF
MARMATON RIVER
RIVER
Springfield
GASCONADE RIVER

Lake of the Ozarks

PROJECT TITLE

RIVER BASIN . . . . . Osage
STATE(S) . . . . . Missouri
PROBABLE STUDY SECTION . . . . . 3(a)(c)

PROBLEMS Type		Range (1-5)
a.	water-craft wastes	5
b.	recreation pressure	5
c.	refuse dumping	5
d.	fragile resource	4
e.	high coliform counts	3
f.	septic tanks	3
g.	inadequate municipal waste treatment	1
h.		
i.		
j.		

SUB TOTAL 26

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	
Commercial fish propagation	15
Propagation of warm and/or cold water sport fish	14
Livestock watering	11
Irrigation	
Fishing	9
Wildlife watering	13
Boating and canoeing	10
Industrial cooling supply	7
Industrial process supply	
Hydroelectric power	5
Aesthetic value	12
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 118

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	9	Cooperation potential	7
Overall problem magnitude	8	Compliance with Water Quality Standards	4
Data availability	3	Enforcement implications	3
Readiness factor	9	Money required	7
Difficulty of plan production	5	Manpower required	6
		Other	

SUB TOTAL 61

SUMMATION TOTAL 205

EMI VALUE 5

PRIORITY RATING NUMBER 1025

Gasconade River

PROJECT TITLE

RIVER BASIN . . . . . Gasconade
STATE(S) . . . . . Missouri
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		**Range** (1-5)
a.	nutrients	5
b.	fragile resources	5
c.	sedimentation-erosion	4
d.	recreation-use pressure	2
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 16

WATER USES	**Range** (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	8
Irrigation	
Fishing	12
Wildlife watering	11
Boating and canoeing	13
Industrial cooling supply	
Industrial process supply	6
Hydroelectric power	
Aesthetic value	15
Navigation	
Receive surface runoff	2
Receive effluents	1
Low flow augmentation	

SUB TOTAL 115

PRACTICAL CONSIDERATIONS	**Range** (1-10)		
Urgency for study	5	Cooperation potential	3
Overall problem magnitude	5	Compliance with Water Quality Standards	1
Data availability	4	Enforcement implications	1
Readiness factor	3	Money required	3
Difficulty of plan production	7	Manpower required	4
		Other	

SUB TOTAL 36

SUMMATION TOTAL 167

EMI VALUE 5

PRIORITY RATING NUMBER 835

St. Joseph

PROJECT TITLE

RIVER BASIN . . . . . Lower Missouri
STATE(S) . . . . . Missouri
PROBABLE STUDY SECTION . . . . . 3(c)

PROBLEMS Type		Range (1-5)
a.	incomplete interceptor sewer	5
b.	urbanization	4
c.	sedimentation	4
d.	industrial wastes	3
e.	meat packing wastes	3
f.	inadequate waste treatment	3
g.	herbicides-pesticides	2
h.	refuse dumping	2
i.		
j.		

SUB TOTAL 26

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	14
Propagation of warm and/or cold water sport fish	
Livestock watering	9
Irrigation	10
Fishing	8
Wildlife watering	11
Boating and canoeing	4
Industrial cooling supply	7
Industrial process supply	6
Hydroelectric power	
Aesthetic value	5
Navigation	3
Receive surface runoff	2
Receive effluents	1
Low flow augmentation	

SUB TOTAL 96

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	7	Cooperation potential	8
Overall problem magnitude	8	Compliance with Water Quality Standards	9
Data availability	6	Enforcement implications	9
Readiness factor	7	Money required	7
Difficulty of plan production	5	Manpower required	8
		Other	

SUB TOTAL 76

SUMMATION TOTAL 198

EMI VALUE 4

PRIORITY RATING NUMBER 780

Kansas City Metro Area

PROJECT TITLE

RIVER BASIN . . . . . Lower Missouri
STATE(S) . . . . . Missouri
PROBABLE STUDY SECTION . . . . . 3(c)

PROBLEMS Type	Range (1-5)	
a.	sedimentation	5
b.	industrial waste discharges	4
c.	urbanization	4
d.	refuse dumping	4
e.	herbicides-pesticides	3
f.	combined sewers	3
g.	septic tanks	2
h.	inadequate STP operation	2
i.		
j.		

SUB TOTAL 27

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	13
Propagation of warm and/or cold water sport fish	
Livestock watering	9
Irrigation	10
Fishing	8
Wildlife watering	11
Boating and canoeing	4
Industrial cooling supply	7
Industrial process supply	6
Hydroelectric power	
Aesthetic value	5
Navigation	3
Receive surface runoff	2
Receive effluents	1
Low flow augmentation	

SUB TOTAL 95

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	8	Cooperation potential	4
Overall problem magnitude	7	Compliance with Water Quality Standards	6
Data availability	7	Enforcement implications	5
Readiness factor	8	Money required	8
Difficulty of plan production	5	Manpower required	7
		Other	

SUB TOTAL 63

SUMMATION TOTAL 185

EMI VALUE 4

PRIORITY RATING NUMBER 748

St. Louis Metro

PROJECT TITLE

RIVER BASIN . . . . . Lower Missouri
STATE(S) . . . . . Missouri
PROBABLE STUDY SECTION . . . . . 3(c)

PROBLEMS Type		Range (1-5)
a.	sedimentation	5
b.	herbicides-pesticides	3
c.	urbanization	3
d.	industrial waste discharges	3
e.	inadequate STP operation	2
f.	inadequate waste treatment	2
g.	toxicity	2
h.		
i.		
j.		

SUB TOTAL [ ]

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	13
Propagation of warm and/or cold water sport fish	
Livestock watering	9
Irrigation	10
Fishing	8
Wildlife watering	11
Boating and canoeing	4
Industrial cooling supply	7
Industrial process supply	6
Hydroelectric power	
Aesthetic value	5
Navigation	3
Receive surface runoff	2
Receive effluents	1
Low flow augmentation	

SUB TOTAL [ ]

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	7	Cooperation potential	8
Overall problem magnitude	5	Compliance with Water Quality Standards	4
Data availability	8	Enforcement implications	3
Readiness factor	9	Money required	8
Difficulty of plan production	8	Manpower required	9
		Other	

SUB TOTAL [ ]

SUMMATION TOTAL [184]

EMI VALUE 4

PRIORITY RATING NUMBER 736

Grand River

PROJECT TITLE

RIVER BASIN . . . . . Grand
STATE(S) . . . . . Missouri and Iowa
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	sedimentation-erosion	4
b.	refuse dumping	3
c.	agricultural runoff	3
d.	mine drainage	2
e.	poor quality ground water	2
f.	mineralization (surface water)	2
g.	municipal waste discharges	1
h.	industrial waste discharges	1
i.		
j.		

SUB TOTAL 18

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	11
Irrigation	12
Fishing	9
Wildlife watering	13
Boating and canoeing	5
Industrial cooling supply	5
Industrial process supply	
Hydroelectric power	4
Aesthetic value	8
Navigation	
Receive surface runoff	2
Receive effluents	1
Low flow augmentation	

SUB TOTAL 118

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	3	Cooperation potential	1
Overall problem magnitude	5	Compliance with Water Quality Standards	2
Data availability	3	Enforcement implications	1
Readiness factor	3	Money required	5
Difficulty of plan production	5	Manpower required	4
		Other	

SUB TOTAL 12

SUMMATION TOTAL 168

EMI VALUE 2

PRIORITY RATING NUMBER 336

Chariton River

PROJECT TITLE

RIVER BASIN . . . . . Chariton
STATE(S) . . . . . Missouri-Iowa
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		**Range** (1-5)
a.	sedimentation-erosion	3
b.	acid mine drainage	2
c.	poor grade water quality	2
d.	mineralization (surface)	2
e.	agricultural runoff	2
f.	municipal effluents	1
g.	industrial effluents	1
h.		
i.		
j.		

SUB TOTAL 13

WATER USES	**Range** (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	9
Irrigation	10
Fishing	7
Wildlife watering	13
Boating and canoeing	4
Industrial cooling supply	
Industrial process supply	
Hydroelectric power	
Aesthetic value	3
Navigation	
Receive surface runoff	2
Receive effluents	
Low flow augmentation	

SUB TOTAL 95

PRACTICAL CONSIDERATIONS	**Range** (1-10)		
Urgency for study	3	Cooperation potential	1
Overall problem magnitude	4	Compliance with Water Quality Standards	2
Data availability	3	Enforcement implications	1
Readiness factor	2	Money required	5
Difficulty of plan production	5	Manpower required	4
		Other	

SUB TOTAL 30

SUMMATION TOTAL 138

EMI VALUE 2

PRIORITY RATING NUMBER 276

Platte River

PROJECT TITLE

RIVER BASIN . . . . . Middle Missouri
STATE(S) . . . . . Missouri-Iowa
PROBABLE STUDY SECTION . . . . . 3(c)

PROBLEMS Type		Range (1-5)
a.	low flows	4
b.	inadequate sewage treatment	4
c.	industrial wastes	3
d.	mineralization	3
e.	poor ground water quality	2
f.	agricultural runoff	2
g.	municipal STP operations	1
h.		
i.		
j.		

SUB TOTAL [ ]

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	9
Irrigation	10
Fishing	
Wildlife watering	13
Boating and canoeing	
Industrial cooling supply	
Industrial process supply	
Hydroelectric power	
Aesthetic value	3
Navigation	
Receive surface runoff	2
Receive effluents	1
Low flow augmentation	

SUB TOTAL [ ]

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	3	Cooperation potential	5
Overall problem magnitude	4	Compliance with Water Quality Standards	3
Data availability	5	Enforcement implications	2
Readiness factor	5	Money required	7
Difficulty of plan production	6	Manpower required	8
		Other	

SUB TOTAL [ ]

SUMMATION TOTAL [137]

EMI VALUE 2

PRIORITY RATING NUMBER 274

Marmaton River

PROJECT TITLE

RIVER BASIN . . . . . Osage
STATE(S) . . . . . Missouri
PROBABLE STUDY SECTION . . . . . functional

PROBLEMS Type		Range (1-5)
a.	mineralization	5
b.	poor grade water quality	4
c.	insufficient grade water	3
d.	old abandoned mines	1
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL [ ]

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	
Livestock watering	10
Irrigation	
Fishing	
Wildlife watering	13
Boating and canoeing	
Industrial cooling supply	
Industrial process supply	
Hydroelectric power	
Aesthetic value	
Navigation	
Receive surface runoff	
Receive effluents	
Low flow augmentation	

SUB TOTAL [ ]

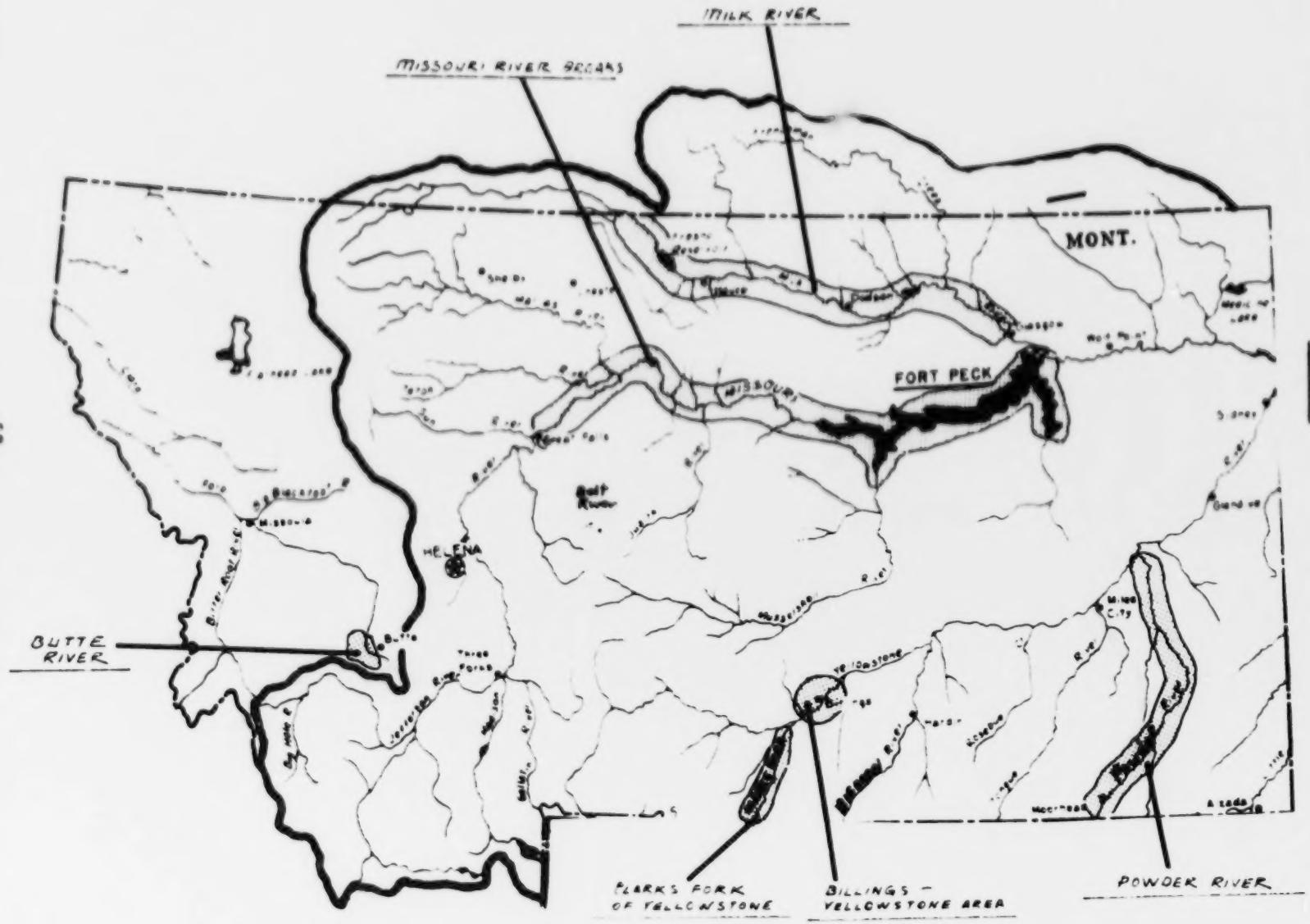
PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study		Cooperation potential	
Overall problem magnitude		Compliance with Water Quality Standards	
Data availability	2	Enforcement implications	
Readiness factor		Money required	
Difficulty of plan production		Manpower required	
		Other	

SUB TOTAL [ ]

SUMMATION TOTAL [ ]

EMI VALUE

PRIORITY RATING NUMBER


MILK RIVER
MISSOURI RIVER BASINS
MONT.
FORT PECK
MISSOURI
HELENA
BUTTE RIVER
CLARKS FORK OF YELLOWSTONE
BILLINGS - YELLOWSTONE AREA
POWDER RIVER

Billings-Yellowstone Area

PROJECT TITLE

RIVER BASIN . . . . . Yellowstone
STATE(S) . . . . . Montana
PROBABLE STUDY SECTION . . . . . 3(a) and (c)

PROBLEMS Type		Range (1-5)
a.	industrial waste discharges	5
b.	chemical wastes	5
c.	petroleum refineries	5
d.	temperature	4
e.	irrigation return flows	3
f.	sedimentation	3
g.	fragile resource	3
h.		
i.		
j.		

SUB TOTAL [ ]

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	16
Livestock watering	9
Irrigation	8
Fishing	11
Wildlife watering	13
Boating and canoeing	10
Industrial cooling supply	5
Industrial process supply	9
Hydroelectric power	
Aesthetic value	12
Navigation	
Receive surface runoff	1
Receive effluents	2
Low flow augmentation	

SUB TOTAL [ ]

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	7	Cooperation potential	8
Overall problem magnitude	7	Compliance with Water Quality Standards	4
Data availability	5	Enforcement implications	1
Readiness factor	8	Money required	1
Difficulty of plan production	2	Manpower required	3
		Other	

SUB TOTAL [ ]

SUMMATION TOTAL [ ]

EMI VALUE [ ]

PRIORITY RATING NUMBER 824

Clarks Fork of Yellowstone

PROJECT TITLE

RIVER BASIN . . . . . Yellowstone
STATE(S) . . . . . Montana
PROBABLE STUDY SECTION . . . . . 3(c)

PROBLEMS Type	Range (1-5)
a. irrigation return flows	4
b. sedimentation	4
c. fragile resource	4
d.	
e.	
f.	
g.	
h.	
i.	
j.	

SUB TOTAL [ ]

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	9
Irrigation	8
Fishing	11
Wildlife watering	13
Boating and canoeing	10
Industrial cooling supply	
Industrial process supply	7
Hydroelectric power	6
Aesthetic value	12
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL [ ]

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	5	Cooperation potential	8
Overall problem magnitude	3	Compliance with Water Quality Standards	2
Data availability	4	Enforcement implications	1
Readiness factor	5	Money required	3
Difficulty of plan production	3	Manpower required	1
		Other	

SUB TOTAL [ ]

SUMMATION TOTAL [ ]

EMI VALUE [ ]

PRIORITY RATING NUMBER [ ]

Missouri River Breaks

PROJECT TITLE

RIVER BASIN . . . . . Upper Missouri
STATE(S) . . . . . Montana
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	sedimentation-erosion	5
b.	fragile resource	5
c.	irrigation return flows	1
d.	feedlot runoff	1
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL [12]

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	10
Irrigation	9
Fishing	12
Wildlife watering	13
Boating and canoeing	11
Industrial cooling supply	
Industrial process supply	7
Hydroelectric power	6
Aesthetic value	5
Navigation	
Receive surface runoff	1
Receive effluents	2
Low flow augmentation	

SUB TOTAL [12]

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	6	Cooperation potential	7
Overall problem magnitude	3	Compliance with Water Quality Standards	1
Data availability	3	Enforcement implications	1
Readiness factor	4	Money required	4
Difficulty of plan production	4	Manpower required	3
		Other	

SUB TOTAL [16]

SUMMATION TOTAL [173]

EMI VALUE 1

PRIORITY RATING NUMBER 173

Milk River

PROJECT TITLE

RIVER BASIN . . . . . Upper Missouri
STATE(S) . . . . . Montana
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type	Range (1-5)	
a.	irrigation return flows	5
b.	sedimentation-erosion	5
c.	municipal waste discharges	2
d.	industrial wastes	2
e.	inadequate STP	2
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 16

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	10
Irrigation	9
Fishing	12
Wildlife watering	13
Boating and canoeing	11
Industrial cooling supply	
Industrial process supply	7
Hydroelectric power	
Aesthetic value	5
Navigation	
Receive surface runoff	1
Receive effluents	2
Low flow augmentation	

SUB TOTAL 110

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	4	Cooperation potential	5
Overall problem magnitude	5	Compliance with Water Quality Standards	3
Data availability	3	Enforcement implications	2
Readiness factor	3	Money required	2
Difficulty of plan production	5	Manpower required	3
		Other	

SUB TOTAL 35

SUMMATION TOTAL 170

EMI VALUE 3

PRIORITY RATING NUMBER 510

Powder River

PROJECT TITLE

RIVER BASIN . . . . . Yellowstone River
STATE(S) . . . . . Montana-Wyoming
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	sedimentation-erosion	5
b.	low flows	4
c.	hydrogeration (coal)	3
d.	irrigation return flows	3
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 15

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	10
Irrigation	9
Fishing	12
Wildlife watering	13
Boating and canoeing	11
Industrial cooling supply	
Industrial process supply	7
Hydroelectric power	
Aesthetic value	5
Navigation	
Receive surface runoff	3
Receive effluents	
Low flow augmentation	

SUB TOTAL 117

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	4	Cooperation potential	7
Overall problem magnitude	5	Compliance with Water Quality Standards	4
Data availability	5	Enforcement implications	3
Readiness factor	3	Money required	2
Difficulty of plan production	4	Manpower required	2
		Other	

SUB TOTAL 36

SUMMATION TOTAL 171

EMI VALUE 2

PRIORITY RATING NUMBER 342

Butte

PROJECT TITLE

RIVER BASIN . . . . . Clark Fork (partially across divide)
STATE(S) . . . . . Montana
PROBABLE STUDY SECTION . . . . . functional

PROBLEMS Type	Range (1-5)	
a.	acid mine drainage	3
b.		
c.		
d.		
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL [ ]

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	
Livestock watering	
Irrigation	
Fishing	
Wildlife watering	
Boating and canoeing	
Industrial cooling supply	
Industrial process supply	7
Hydroelectric power	
Aesthetic value	5
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL [ ]

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	3	Cooperation potential	7
Overall problem magnitude	2	Compliance with Water Quality Standards	4
Data availability	4	Enforcement implications	3
Readiness factor	3	Money required	6
Difficulty of plan production	6	Manpower required	7
		Other	

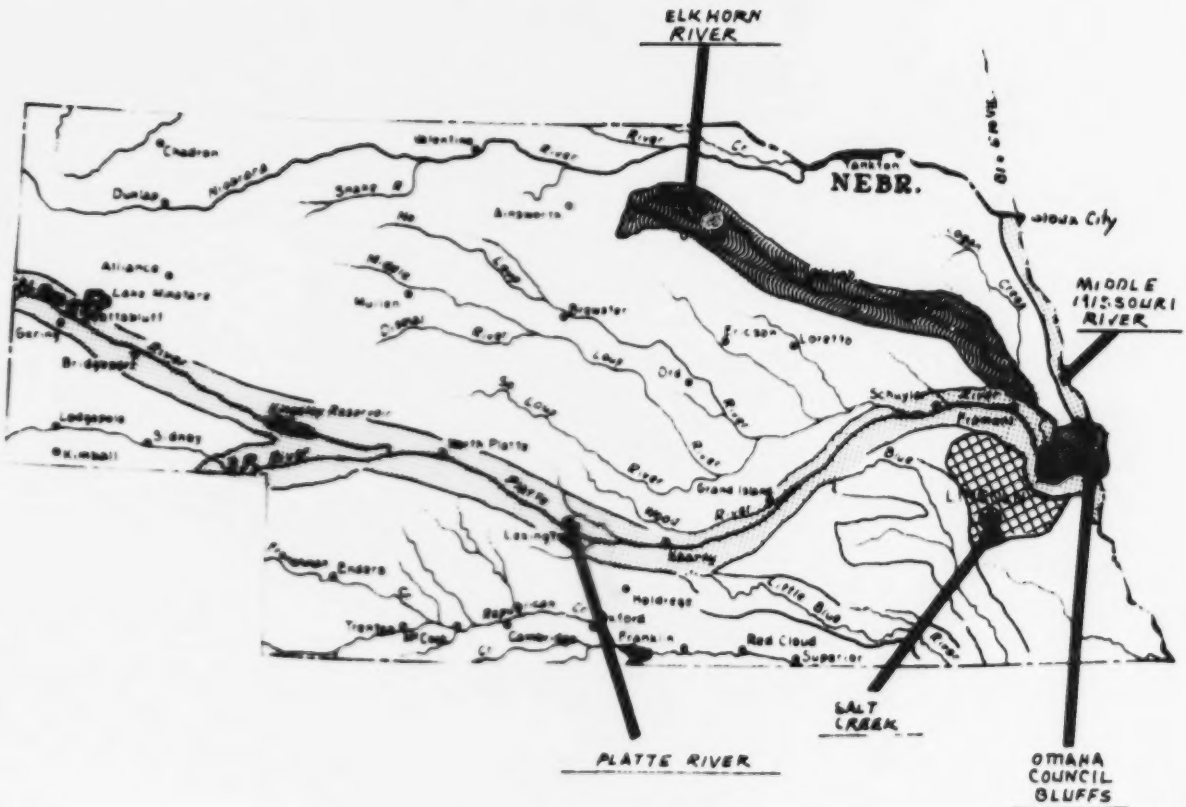
SUB TOTAL [ ]

SUMMATION TOTAL [65]

EMI VALUE 3

PRIORITY RATING NUMBER 195

NEBRASKA


ELKHORN RIVER
NEBR.
MIDDLE MISSOURI RIVER
PLATTE RIVER
SALT CREEK
OMAHA COUNCIL BLUFFS

Middle Missouri River

PROJECT TITLE

RIVER BASIN . . . . . Middle Missouri
STATE(S) . . . . . Nebraska-Iowa
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type	Range (1-5)	
a.	sedimentation	5
b.	nuclear plants	4
c.	temperature	4
d.	inadequate STP	4
e.	meat packing wastes	4
f.	herbicides-pesticides	3
g.	feedlot runoff	3
h.	urbanization	3
i.	coliform counts	2
j.	industrial wastes	2

SUB TOTAL [illegible]

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	15
Propagation of warm and/or cold water sport fish	14
Livestock watering	11
Irrigation	12
Fishing	9
Wildlife watering	13
Boating and canoeing	10
Industrial cooling supply	8
Industrial process supply	7
Hydroelectric power	6
Aesthetic value	5
Navigation	4
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL [illegible]

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	8	Cooperation potential	1
Overall problem magnitude	10	Compliance with Water Quality Standards	6
Data availability	8	Enforcement implications	9
Readiness factor	5	Money required	3
Difficulty of plan production	5	Manpower required	3
		Other	

SUB TOTAL [illegible]

SUMMATION TOTAL 229

EMI VALUE 4

PRIORITY RATING NUMBER 916

Omaha-Council Bluffs

PROJECT TITLE

RIVER BASIN . . . . . Middle Missouri
STATE(S) . . . . . Nebraska-Iowa
PROBABLE STUDY SECTION . . . . . 3(c)

PROBLEMS Type		Range (1-5)
a.	meat packing waste	5
b.	industrial waste discharges	3
c.	sedimentation	3
d.	herbicides-pesticides	3
e.	feedlot runoff	3
f.	urbanization	2
g.	refuse dumping	2
h.	septic tank systems	2
i.	inadequate STP operations	2
j.		

SUB TOTAL 25

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	15
Propagation of warm and/or cold water sport fish	14
Livestock watering	11
Irrigation	12
Fishing	10
Wildlife watering	13
Boating and canoeing	9
Industrial cooling supply	6
Industrial process supply	7
Hydroelectric power	
Aesthetic value	4
Navigation	
Receive surface runoff	2
Receive effluents	
Low flow augmentation	

SUB TOTAL 120

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	9	Cooperation potential	10
Overall problem magnitude	9	Compliance with Water Quality Standards	8
Data availability	8	Enforcement implications	7
Readiness factor	10	Money required	7
Difficulty of plan production	7	Manpower required	8
		Other	

SUB TOTAL 54

SUMMATION TOTAL 228

EMI VALUE 4

PRIORITY RATING NUMBER 912

Platte River

PROJECT TITLE

RIVER BASIN . . . . . Platte
STATE(S) . . . . . Nebraska
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	municipal waste discharges	5
b.	sedimentation-erosion	4
c.	irrigation return flows	3
d.	inadequate STP operation	3
e.	industrial waste discharges	3
f.	inadequate STP	3
g.	feedlot runoff	2
h.		
i.		
j.		

SUB TOTAL [illegible]

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	11
Irrigation	12
Fishing	10
Wildlife watering	13
Boating and canoeing	7
Industrial cooling supply	5
Industrial process supply	6
Hydroelectric power	4
Aesthetic value	3
Navigation	
Receive surface runoff	2
Receive effluents	1
Low flow augmentation	

SUB TOTAL 104

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	9	Cooperation potential	7
Overall problem magnitude	8	Compliance with Water Quality Standards	7
Data availability	7	Enforcement implications	6
Readiness factor	7	Money required	5
Difficulty of plan production	5	Manpower required	5
		Other	

SUB TOTAL 66

SUMMATION TOTAL 193

EMI VALUE 4

PRIORITY RATING NUMBER 772

Salt Creek

PROJECT TITLE

RIVER BASIN . . . . . Platte
STATE(S) . . . . . Nebraska
PROBABLE STUDY SECTION . . . . . 3(c)

PROBLEMS Type		Range (1-5)
a.	irrigation return flows	5
b.	high TDS	4
c.	mineralization	4
d.	low flows	4
e.	sedimentation	3
f.	inadequate treatment plants	3
g.	municipal waste discharges	3
h.	industrial waste discharges	2
i.		
j.		

SUB TOTAL [illegible]

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	11
Irrigation	12
Fishing	
Wildlife watering	13
Boating and canoeing	
Industrial cooling supply	
Industrial process supply	
Hydroelectric power	
Aesthetic value	4
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL [illegible]

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	7	Cooperation potential	[illegible]
Overall problem magnitude	9	Compliance with Water Quality Standards	[illegible]
Data availability	6	Enforcement implications	[illegible]
Readiness factor	7	Money required	6
Difficulty of plan production	6	Manpower required	9
		Other	

SUB TOTAL [illegible]

SUMMATION TOTAL [illegible]

EMI VALUE 4

PRIORITY RATING NUMBER [illegible]

Elkhorn River

PROJECT TITLE

RIVER BASIN . . . . . Platte
STATE(S) . . . . . Nebraska
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	sedimentation	4
b.	feedlot runoff	4
c.	irrigation return flows	3
d.	meat packing wastes	3
e.	municipal waste discharges	3
f.	inadequate STP	3
g.		
h.		
i.		
j.		

SUB TOTAL 20

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	11
Irrigation	12
Fishing	10
Wildlife watering	13
Boating and canoeing	9
Industrial cooling supply	
Industrial process supply	7
Hydroelectric power	
Aesthetic value	4
Navigation	
Receive surface runoff	1
Receive effluents	2
Low flow augmentation	

SUB TOTAL 101

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	4	Cooperation potential	7
Overall problem magnitude	5	Compliance with Water Quality Standards	4
Data availability	4	Enforcement implications	3
Readiness factor	5	Money required	4
Difficulty of plan production	6	Manpower required	3
		Other	

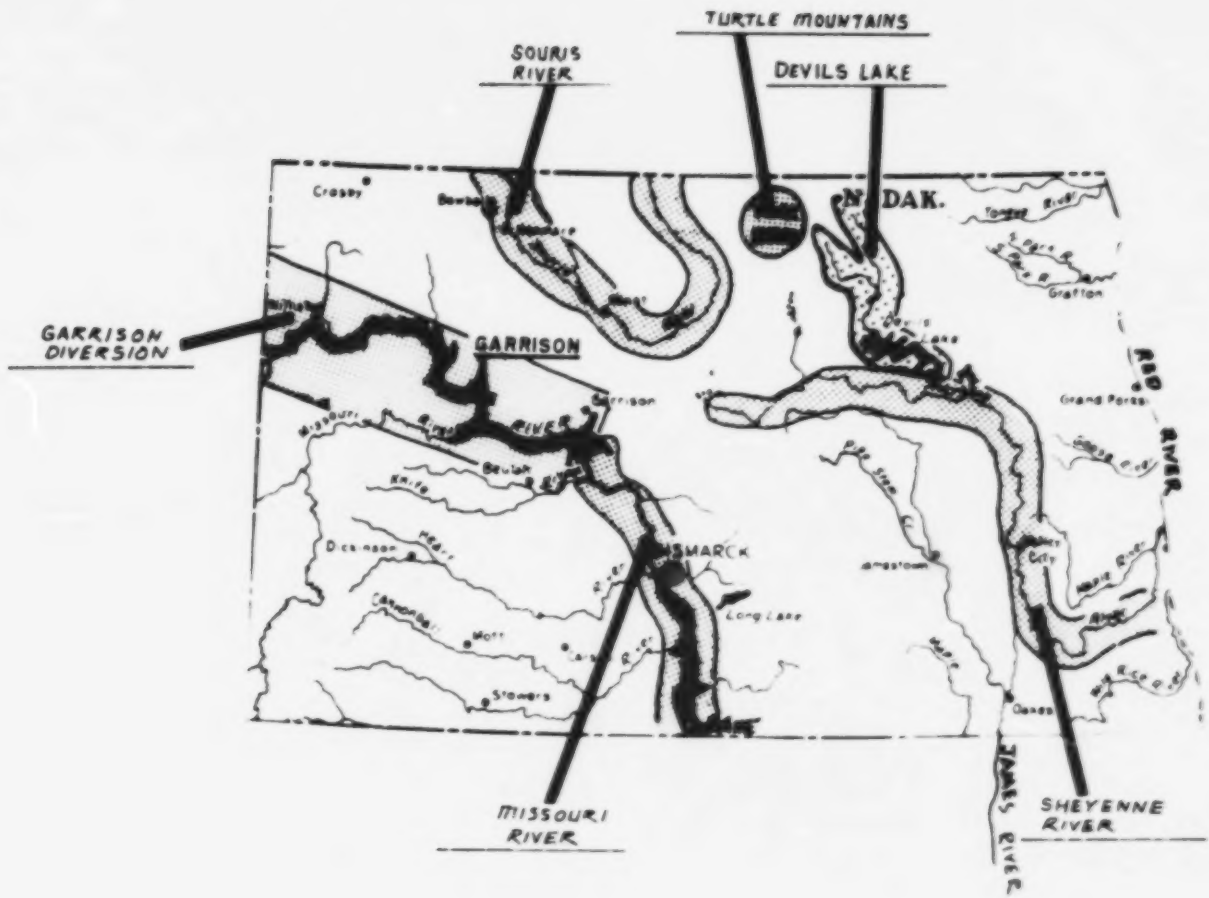
SUB TOTAL 33

SUMMATION TOTAL 166

EMI VALUE 2

PRIORITY RATING NUMBER 332

NORTH DAKOTA



Souris River

PROJECT TITLE

RIVER BASIN . . . . . Souris
STATE(S) . . . . . North Dakota
PROBABLE STUDY SECTION . . . . . 1(a)

PROBLEMS Type		Range (1-5)
a.	organic wastes	4
b.	irrigation return flows	4
c.	high coliform counts	3
d.	excessive nutrients	2
e.	inadequate STP	2
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 15

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	15
Livestock watering	13
Irrigation	12
Fishing	10
Wildlife watering	11
Boating and canoeing	7
Industrial cooling supply	6
Industrial process supply	9
Hydroelectric power	
Aesthetic value	3
Navigation	
Receive surface runoff	2
Receive effluents	1
Low flow augmentation	

SUB TOTAL 122

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	6	Cooperation potential	7
Overall problem magnitude	4	Compliance with Water Quality Standards	4
Data availability	7	Enforcement implications	3
Readiness factor	5	Money required	5
Difficulty of plan production	6	Manpower required	4
		Other	

SUB TOTAL 31

SUMMATION TOTAL 186

EMI VALUE 3

PRIORITY RATING NUMBER 552

Devils Lake

PROJECT TITLE

RIVER BASIN . . . . . Devils Lake Basin
STATE(S) . . . . . North Dakota
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	recreation pressure	2
b.	fragile resource	4
c.	nutrients	1
d.	septic tanks	1
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 11

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	15
Livestock watering	7
Irrigation	8
Fishing	13
Wildlife watering	14
Boating and canoeing	12
Industrial cooling supply	
Industrial process supply	
Hydroelectric power	
Aesthetic value	11
Navigation	
Receive surface runoff	3
Receive effluents	
Low flow augmentation	

SUB TOTAL 116

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	6	Cooperation potential	1
Overall problem magnitude	3	Compliance with Water Quality Standards	3
Data availability	5	Enforcement implications	2
Readiness factor	6	Money required	6
Difficulty of plan production	7	Manpower required	6
		Other	

SUB TOTAL 31

SUMMATION TOTAL 178

EMI VALUE 3

PRIORITY RATING NUMBER 534

Turtle Mountains

PROJECT TITLE

RIVER BASIN . . . . . Souris
STATE(S) . . . . . North Dakota
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type	Range (1-5)	
a.	eutrophication	5
b.	fragile resources	5
c.		
d.		
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 10

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	15
Livestock watering	
Irrigation	
Fishing	11
Wildlife watering	12
Boating and canoeing	8
Industrial cooling supply	
Industrial process supply	
Hydroelectric power	
Aesthetic value	14
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 98

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	3	Cooperation potential	1
Overall problem magnitude	3	Compliance with Water Quality Standards	2
Data availability	3	Enforcement implications	1
Readiness factor	2	Money required	4
Difficulty of plan production	5	Manpower required	3
		Other	

SUB TOTAL 11

SUMMATION TOTAL 141

EMI VALUE 3

PRIORITY RATING NUMBER 423

Missouri River

PROJECT TITLE

RIVER BASIN . . . . . Western Dakota Subbasin
STATE(S) . . . . . North Dakota
PROBABLE STUDY SECTION . . . . . _____

PROBLEMS Type		Range (1-5)
a.	irrigation return flows	4
b.	municipal waste discharges	3
c.	sedimentation	2
d.	inadequate STP	2
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 11

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	15
Livestock watering	13
Irrigation	12
Fishing	10
Wildlife watering	11
Boating and canoeing	7
Industrial cooling supply	6
Industrial process supply	9
Hydroelectric power	5
Aesthetic value	3
Navigation	
Receive surface runoff	2
Receive effluents	1
Low flow augmentation	

SUB TOTAL 127

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	6	Cooperation potential	6
Overall problem magnitude	3	Compliance with Water Quality Standards	4
Data availability	5	Enforcement implications	1
Readiness factor	4	Money required	1
Difficulty of plan production	4	Manpower required	1
		Other	

SUB TOTAL 41

SUMMATION TOTAL 179

EMI VALUE 2

PRIORITY RATING NUMBER 358

Sheyenne River

PROJECT TITLE

RIVER BASIN . . . . . Red
STATE(S) . . . . . North Dakota
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	irrigation return flows	5
b.	industrial waste discharges	3
c.		
d.		
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 8

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	15
Livestock watering	13
Irrigation	12
Fishing	10
Wildlife watering	11
Boating and canoeing	7
Industrial cooling supply	6
Industrial process supply	9
Hydroelectric power	
Aesthetic value	3
Navigation	
Receive surface runoff	2
Receive effluents	1
Low flow augmentation	

SUB TOTAL 122

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	2	Cooperation potential	7
Overall problem magnitude	2	Compliance with Water Quality Standards	3
Data availability	4	Enforcement implications	2
Readiness factor	3	Money required	4
Difficulty of plan production	5	Manpower required	4
		Other	

SUB TOTAL 16

SUMMATION TOTAL 166

EMI VALUE 2

PRIORITY RATING NUMBER 332

Garrison Diversion

PROJECT TITLE

RIVER BASIN . . . . . Upper Missouri
STATE(S) . . . . . North Dakota
PROBABLE STUDY SECTION . . . . . Functional

PROBLEMS Type	Range (1-5)	
a.	irrigation return flows	5
b.		
c.		
d.		
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 5

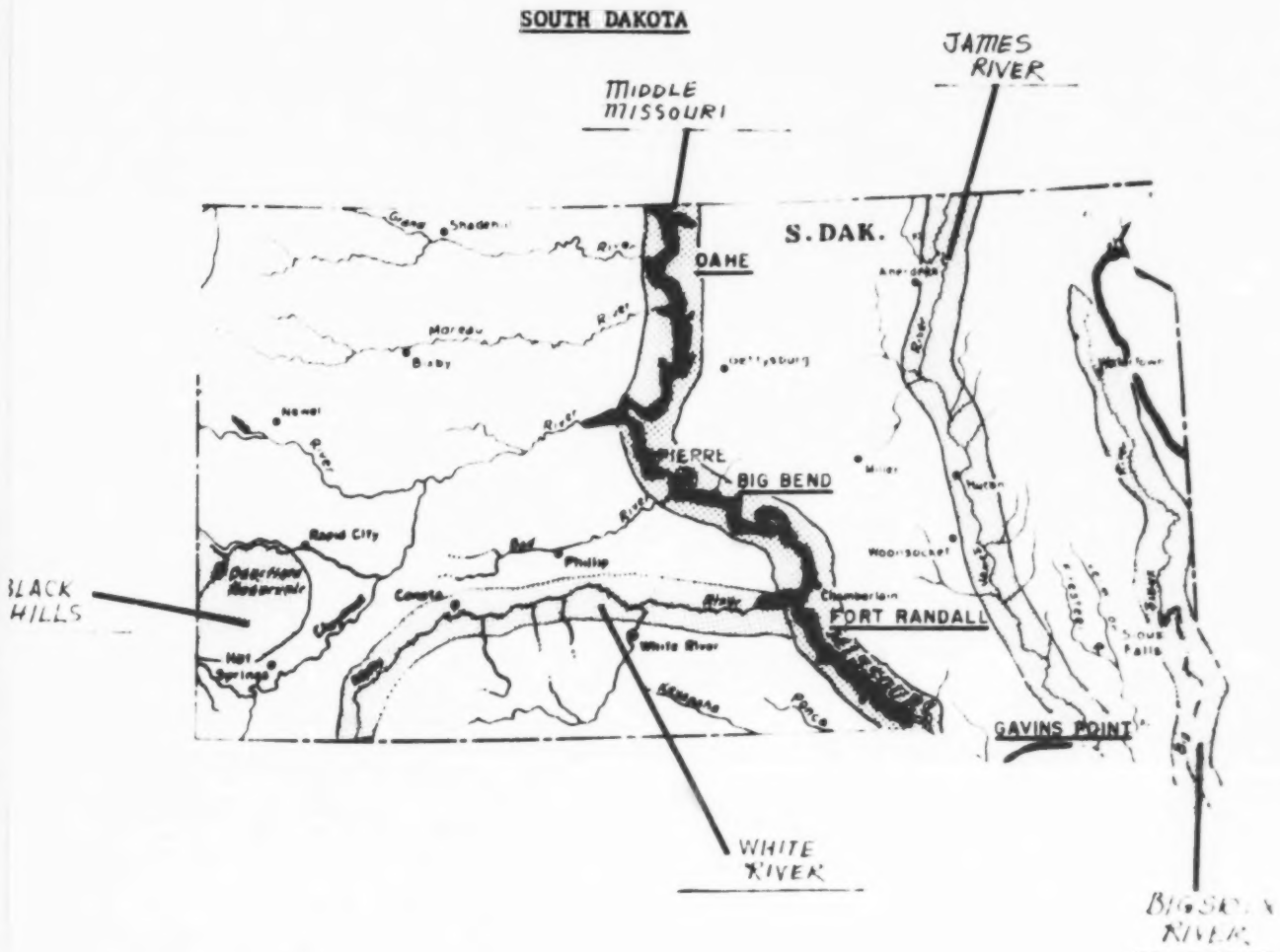
WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	
Livestock watering	13
Irrigation	12
Fishing	
Wildlife watering	11
Boating and canoeing	
Industrial cooling supply	
Industrial process supply	
Hydroelectric power	
Aesthetic value	
Navigation	
Receive surface runoff	2
Receive effluents	
Low flow augmentation	

SUB TOTAL 38

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	6	Cooperation potential	7
Overall problem magnitude	2	Compliance with Water Quality Standards	2
Data availability	5	Enforcement implications	1
Readiness factor	6	Money required	5
Difficulty of plan production	5	Manpower required	5
		Other	

SUB TOTAL 44

SUMMATION TOTAL	87
EMI VALUE	3
PRIORITY RATING NUMBER	261


SOUTH DAKOTA
JAMES RIVER
MIDDLE MISSOURI
S. DAK.
OAHE
PIERRE
BIG BEND
FORT RANDALL
GAVINS POINT
BLACK HILLS
WHITE RIVER
Rapid City
Hot Springs
Pierre
Huron
Yankton

Black Hills

PROJECT TITLE

RIVER BASIN . . . . . Cheyenne - Belle Fourche
STATE(S) . . . . . South Dakota
PROBABLE STUDY SECTION . . . . . 3(c)

PROBLEMS Type		Range (1-5)
a.	sedimentation - erosion	5
b.	heavy recreation pressure	5
c.	mining operations	5
d.	agricultural runoff	3
e.	destruction of riparian vegetation	3
f.	road construction	3
g.	temperature	2
h.	cattle grazing	2
i.	inadequate STP operation	2
j.	chemical wastes	1

SUB TOTAL 31

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	15
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	16
Livestock watering	7
Irrigation	8
Fishing	10
Wildlife watering	11
Boating and canoeing	9
Industrial cooling supply	5
Industrial process supply	6
Hydroelectric power	
Aesthetic value	12
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 121

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	10	Cooperation potential	9
Overall problem magnitude	9	Compliance with Water Quality Standards	4
Data availability	7	Enforcement implications	3
Readiness factor	9	Money required	4
Difficulty of plan production	6	Manpower required	5
		Other	

SUB TOTAL 66

SUMMATION TOTAL 218

EMI VALUE 5

PRIORITY RATING NUMBER 1090

James River

PROJECT TITLE

RIVER BASIN . . . . . James River
STATE(S) . . . . . North and South Dakota
PROBABLE STUDY SECTION . . . . . 3(a) & 3(c)

PROBLEMS Type		Range (1-5)
a.	sedimentation - erosion	5
b.	irrigation return flows	5
c.	feedlot runoff	5
d.	high TDS	5
e.	municipal wastes	3
f.	temperature	2
g.	low flows	2
h.		
i.		
j.		

SUB TOTAL 27

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	15
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	16
Livestock watering	9
Irrigation	10
Fishing	14
Wildlife watering	12
Boating and canoeing	13
Industrial cooling supply	7
Industrial process supply	8
Hydroelectric power	
Aesthetic value	6
Navigation	
Receive surface runoff	4
Receive effluents	2
Low flow augmentation	

SUB TOTAL 116

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	10	Cooperation potential	9
Overall problem magnitude	9	Compliance with Water Quality Standards	3
Data availability	6	Enforcement implications	1
Readiness factor	6	Money required	3
Difficulty of plan production	5	Manpower required	4
		Other	

SUB TOTAL

SUMMATION TOTAL 215

EMI VALUE 4

PRIORITY RATING NUMBER 860

Middle Missouri River

PROJECT TITLE

RIVER BASIN . . . . . Middle Missouri River
STATE(S) . . . . . South Dakota
PROBABLE STUDY SECTION . . . . . 3(a) & 3(c)

PROBLEMS Type		Range (1-5)
a.	feedlot runoff	4
b.	irrigation return flows	3
c.	municipal waste discharges	3
d.	industrial waste discharges	3
e.	inadequate STP operation	2
f.	sedimentation	1
g.		
h.		
i.		
j.		

SUB TOTAL 16

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	14
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	15
Livestock watering	9
Irrigation	10
Fishing	12
Wildlife watering	11
Boating and canoeing	13
Industrial cooling supply	7
Industrial process supply	8
Hydroelectric power	6
Aesthetic value	5
Navigation	4
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 136

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	7	Cooperation potential	7
Overall problem magnitude	6	Compliance with Water Quality Standards	4
Data availability	5	Enforcement implications	3
Readiness factor	5	Money required	4
Difficulty of plan production	6	Manpower required	4
		Other	

SUB TOTAL 31

SUMMATION TOTAL 203

EMI VALUE 3

PRIORITY RATING NUMBER 609

Big Sioux River

PROJECT TITLE

RIVER BASIN . . . . . Middle Missouri
STATE(S) . . . . . South Dakota - Iowa
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	municipal waste discharges	4
b.	feedlot runoff	4
c.	irrigation return flows	3
d.	inadequate STP operation	2
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 13

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	15
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	16
Livestock watering	9
Irrigation	8
Fishing	13
Wildlife watering	10
Boating and canoeing	14
Industrial cooling supply	7
Industrial process supply	
Hydroelectric power	
Aesthetic value	5
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 119

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	6	Cooperation potential	5
Overall problem magnitude	4	Compliance with Water Quality Standards	5
Data availability	5	Enforcement implications	4
Readiness factor	5	Money required	5
Difficulty of plan production	4	Manpower required	4
		Other	

SUB TOTAL 42

SUMMATION TOTAL 179

EMI VALUE 2

PRIORITY RATING NUMBER 358

White River

PROJECT TITLE

RIVER BASIN . . . . . Middle Missouri (subbasin)
STATE(S) . . . . . South Dakota - Nebraska
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	selenium	4
b.	sedimentation	4
c.	low flows	5
d.	municipal waste discharges	2
e.		
f.		
g.		
h.		
i.		
j.		

SUB TOTAL 15

WATER USES	Range (1-17)
Whole Body contact	
Drinking water supply	
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	9
Irrigation	8
Fishing	12
Wildlife watering	10
Boating and canoeing	11
Industrial cooling supply	
Industrial process supply	
Hydroelectric power	
Aesthetic value	2
Navigation	
Receive surface runoff	4
Receive effluents	3
Low flow augmentation	

SUB TOTAL 73

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	5	Cooperation potential	7
Overall problem magnitude	8	Compliance with Water Quality Standards	8
Data availability	5	Enforcement implications	7
Readiness factor	4	Money required	8
Difficulty of plan production	5	Manpower required	8
		Other	

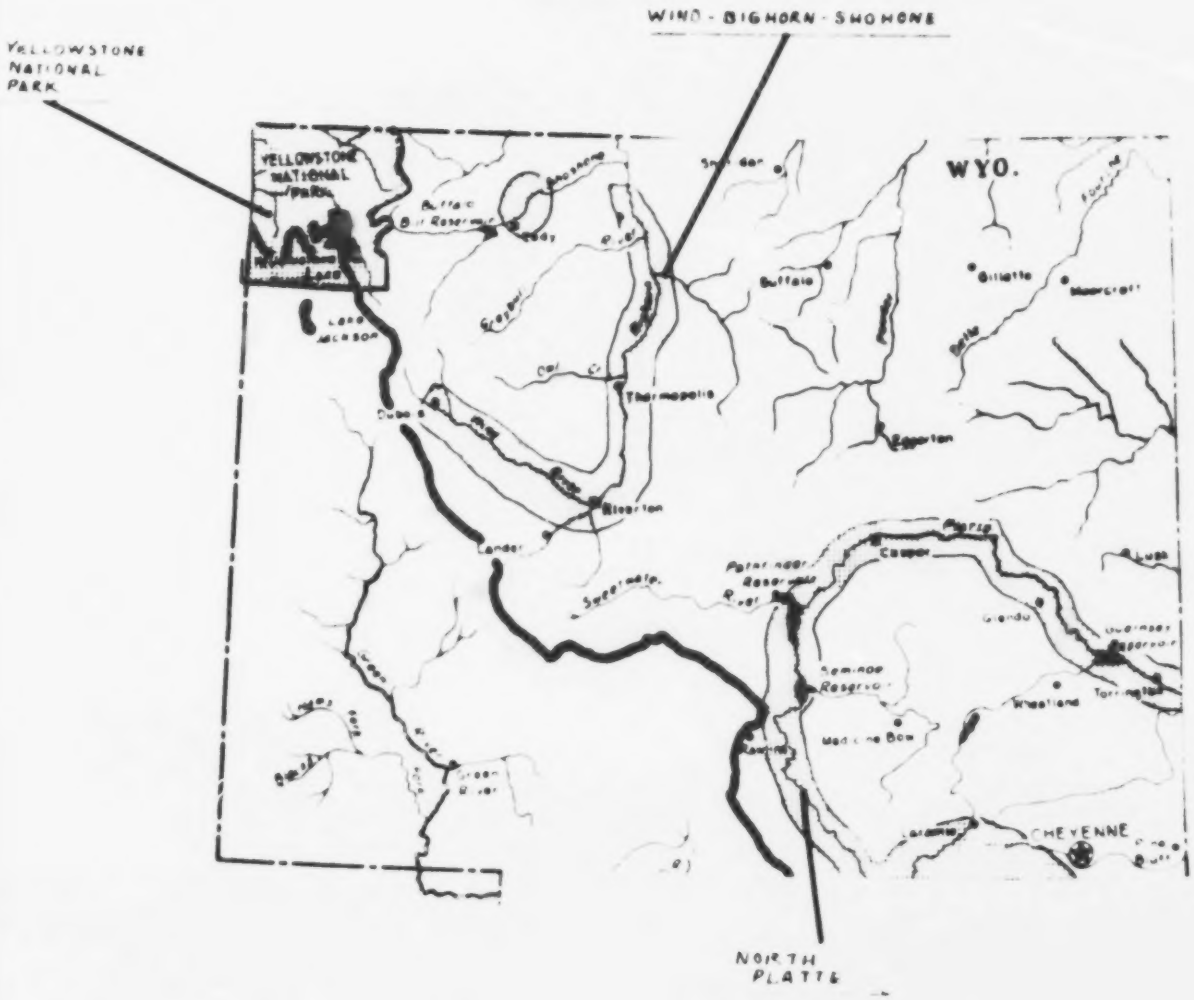
SUB TOTAL 50

SUMMATION TOTAL 125

EMI VALUE 2

PRIORITY RATING NUMBER 250

WYOMING


WIND - BIGHORN - SHOSHONE
YELLOWSTONE NATIONAL PARK
YELLOWSTONE NATIONAL PARK
WYO.
Buffalo
Thermopolis
Riverton
Lander
Casper
Sheridan
Gillette
Sundance
Wheatland
Torrington
Medicine Bow
CHEYENNE
NORTH PLATTE

Yellowstone National Park (including Soda Butte Creek)

PROJECT TITLE

RIVER BASIN . . . . . Yellowstone
STATE(S) . . . . . Wyoming - Montana
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type	Range (1-5)	
a.	heavy recreation pressure	5
b.	fragile resource	5
c.	surface runoff & mineralization	5
d.	mining operations	3
e.	sedimentation - erosion	3
f.	inadequate sewage treatment	3
g.	boat and marina wastes	3
h.	nutrients	2
i.	refuse dumping	2
j.	pesticides	2

SUB TOTAL [37]

WATER USES	Range (1-17)
Whole Body contact	12
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	
Irrigation	
Fishing	10
Wildlife watering	13
Boating and canoeing	11
Industrial cooling supply	
Industrial process supply	
Hydroelectric power	
Aesthetic value	12
Navigation	
Receive surface runoff	3
Receive effluents	
Low flow augmentation	

SUB TOTAL [91]

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	10	Cooperation potential	10
Overall problem magnitude	7	Compliance with Water Quality Standards	5
Data availability	5	Enforcement implications	5
Readiness factor	10	Money required	7
Difficulty of plan production	10	Manpower required	5
		Other	

SUB TOTAL [59]

SUMMATION TOTAL [206]

EMI VALUE 5

PRIORITY RATING NUMBER 1030

North Platte

PROJECT TITLE

RIVER BASIN . . . . . Platte
STATE(S) . . . . . Wyoming-Colorado-Nebraska
PROBABLE STUDY SECTION . . . . . 3(a) & 3(c)

PROBLEMS Type		Range (1-5)
a.	sugar beet plants	4
b.	irrigation return flows	4
c.	industrial waste discharges	4
d.	inadequate STP operation	3
e.	feedlot runoff	3
f.	salinity	3
g.	inadequate STP	3
h.		
i.		
j.		

SUB TOTAL [34]

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	10
Irrigation	9
Fishing	12
Wildlife watering	13
Boating and canoeing	11
Industrial cooling supply	8
Industrial process supply	7
Hydroelectric power	6
Aesthetic value	5
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL [133]

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	7	Cooperation potential	5
Overall problem magnitude	8	Compliance with Water Quality Standards	7
Data availability	7	Enforcement implications	6
Readiness factor	6	Money required	3
Difficulty of plan production	4	Manpower required	2
		Other	

SUB TOTAL [55]

SUMMATION TOTAL [212]

EMI VALUE 4

PRIORITY RATING NUMBER 848

Wind - Bighorn - Shoshone

PROJECT TITLE

RIVER BASIN . . . . . Yellowstone
STATE(S) . . . . . Wyoming - Montana
PROBABLE STUDY SECTION . . . . . 3(a)

PROBLEMS Type		Range (1-5)
a.	sugar beet mills	5
b.	salinity	5
c.	sedimentation - erosion	4
d.	irrigation return flows	4
e.	municipal waste discharges	3
f.	inadequate STP operation	3
g.	industrial waste discharges	3
h.	mining operations	3
i.	oil field wastes	2
j.		

SUB TOTAL 32

WATER USES	Range (1-17)
Whole Body contact	17
Drinking water supply	16
Commercial fish propagation	
Propagation of warm and/or cold water sport fish	14
Livestock watering	10
Irrigation	11
Fishing	12
Wildlife watering	13
Boating and canoeing	9
Industrial cooling supply	
Industrial process supply	7
Hydroelectric power	6
Aesthetic value	5
Navigation	
Receive surface runoff	3
Receive effluents	2
Low flow augmentation	

SUB TOTAL 126

PRACTICAL CONSIDERATIONS	Range (1-10)		
Urgency for study	7	Cooperation potential	7
Overall problem magnitude	9	Compliance with Water Quality Standards	6
Data availability	6	Enforcement implications	8
Readiness factor	4	Money required	8
Difficulty of plan production	4	Manpower required	4
		Other	

SUB TOTAL 51

SUMMATION TOTAL 208

EMI VALUE 4

PRIORITY RATING NUMBER 832

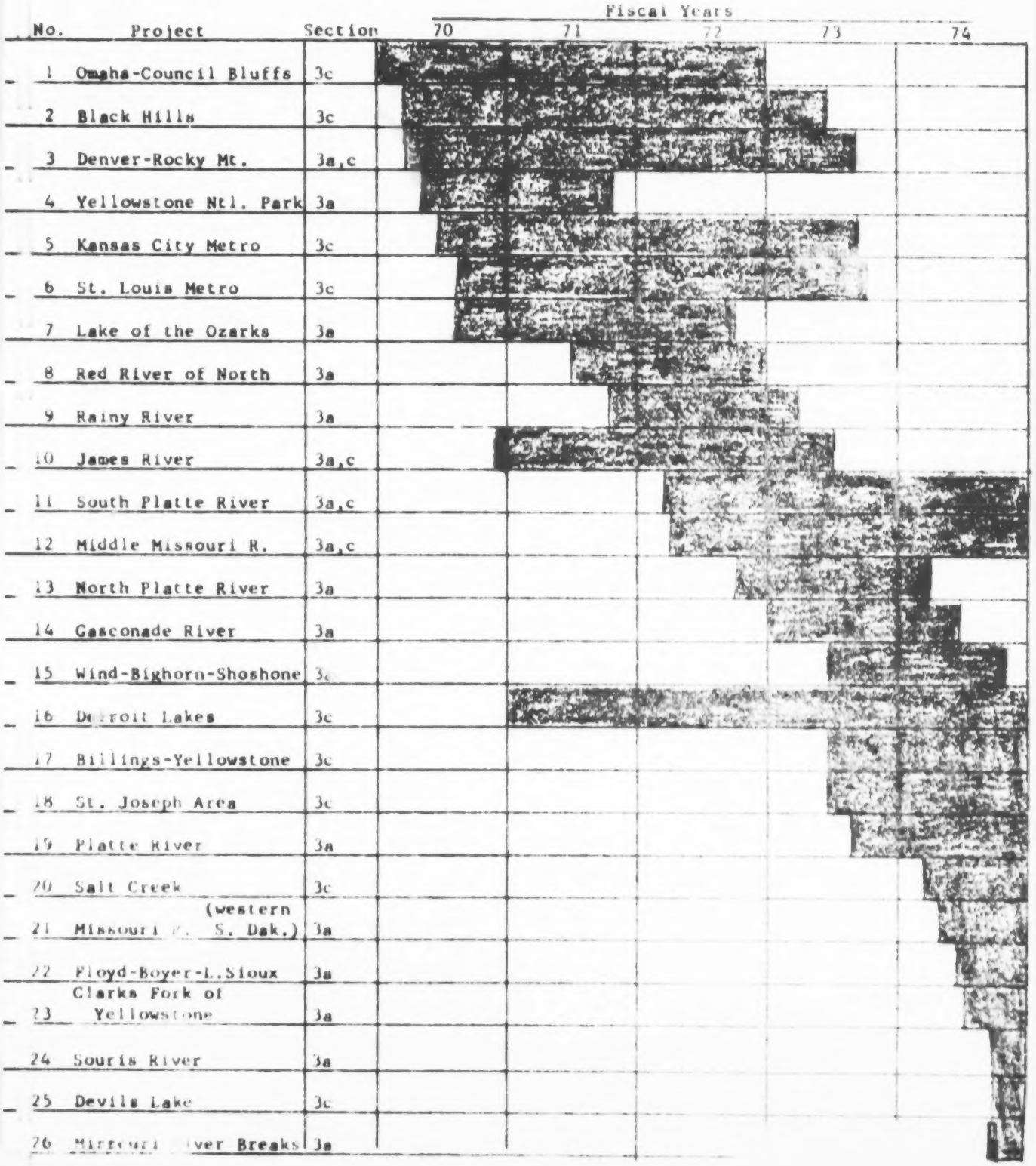
RANK OF PLANNING PROJECTS

Rank	Project Name	Rating Number	State(s)
1.	Black Hills	1090	South Dakota
2.	Denver-Rocky Mountain Area	1048	Colorado Wyoming
3.	Yellowstone National Park	1030	Wyoming Montana
4.	Lake of the Ozarks	1025	Missouri
5.	South Platte River	968	Colorado Nebraska
6.	Rainy River	920	Minnesota
7.	Middle Missouri River	916	Nebraska Iowa
8.	Omaha-Council Bluffs	912	Nebraska Iowa
9.	Red River of the North	904	North Dakota Minnesota
10.	James River	860	South Dakota North Dakota
11.	Middle Missouri River	856	Nebraska Iowa South Dakota
12.	North Platte River	848	Colorado Wyoming Nebraska
13.	Gasconade River	835	Missouri
14.	Wind-Bighorn-Shoshone	832	Wyoming Montana
15.	Billings-Yellowstone Area	824	Montana
16.	Detroit Lakes	815	Minnesota

Rank	Project Name	Rating Number	State(s)
17.	St. Joseph Metro Area	780	Missouri
18.	Platte River	772	Nebraska
19.	Kansas City Metro Area	748	Missouri Kansas
20.	St. Louis Metro	736	Missouri
21.	Salt Creek	616	Nebraska
22.	Missouri River (Western Dakota Subbasin in South Dakota)	609	South Dakota
23.	Floyd-Boyer-Little Sioux	604	Iowa
24.	Clarks Fork of Yellowstone River	552	Montana
25.	Souris River	552	North Dakota
26.	Devils Lake	534	North Dakota
27.	Missouri River Breaks	519	Montana
28.	Milk River	510	Montana
29.	Turtle Mountains	423	North Dakota
30.	Smoky Hill River	388	Kansas
31.	Big Sioux River	358	South Dakota Iowa
32.	Missouri River (Western Dakota Subbasin in North Dakota)	358	North Dakota
33.	Big Blue River-Tuttle Creek (Kansas only)	356	Kansas
34.	Powder River	342	Montana Wyoming
35.	Grand River	336	Missouri
36.	Sheyenne River	332	North Dakota

Rank	Project Name	Rating Number	State(s)
37.	Elkhorn River	332	Nebraska
38.	Fort Collins	316	Colorado
39.	Chariton River	276	Missouri
40.	Platte River	274	Missouri Iowa
41.	White River	250	South Dakota Nebraska
42.	Butte	195	Montana
43.	Garrison Diversion	166	North Dakota
44.	Marmaton River	115	Missouri Kansas

WORK SCHEDULE



No.	Project	Section
1	Omaha-Council Bluffs	3c
2	Black Hills	3c
3	Denver-Rocky Mt.	3a,c
4	Yellowstone Ntl. Park	3a
5	Kansas City Metro	3c
6	St. Louis Metro	3c
7	Lake of the Ozarks	3a
8	Red River of North	3a
9	Rainy River	3a
10	James River	3a,c
11	South Platte River	3a,c
12	Middle Missouri R.	3a,c
13	North Platte River	3a
14	Gasconade River	3a
15	Wind-Bighorn-Shoshone	3c
16	Detroit Lakes	3c
17	Billings-Yellowstone	3c
18	St. Joseph Area	3c
19	Platte River	3a
20	Salt Creek	3c
21	Missouri R. (western S. Dak.)	3a
22	Floyd-Boyer-L.Sioux	3a
23	Clarks Fork of Yellowstone	3a
24	Souris River	3a
25	Devils Lake	3c
26	Missouri River Breaks	3a

MAN-YEARS AND COSTS*

Fiscal Years 1970-1974

No.	Project	Section	Fiscal Years 70	71	72	73	74	Total
			.25	.25	.25			.75 man-years
1	Omaha-Council Bluffs	3c	5	5	5			15,000 costs
			.25	.25	.25			.75
2	Black Hills	3c	5	5	5			15,000
			1	1.5	.5	.12		3.12
3	Denver-Rocky Mountain	3a,c	20	30	10	2		62,000
			1	1.5	.25			2.75
4	Yellowstone Nat'l Pk.	3a	20	30	5			55,000
			.25	.25	.25	.12		.87
5	Kansas City Metro	3c	5	5	5	2		17,000
			.25	.25	.25	.12		.87
6	St. Louis Metro	3c	5	5	5	2		17,000
			.75	1.5	1	.25		3.5
7	Lake of the Ozarks	3a	15	30	20	5		70,000
			.25	1	.25			1.5
8	Red River of the North	3a	5	20	5			30,000
				.5	2	1		3.5
9	Rainy River	3a		10	40	20		70,000
			.15	.5	2	1		3.65
10	James River	3a,c	2	10	40	20		72,000
			.25	.25	1.5	1		3.0
11	South Platte River	3a,c	5	5	30	20		60,000
				.5	1	1	.5	3.0
12	Middle Missouri River	3a,c		10	20	20	10	60,000
				.5	1	2	.5	4.0
13	North Platte River	3a		10	20	40	10	80,000
				.5	1	1.5	.25	3.75
14	Gasconade River	3a		10	20	30	5	65,000
						1	1.5	2.5
15	Wind-Bighorn-Shoshone	3a				20	30	50,000
						.25	.25	.50
16	Billings-Yellowstone	3c				5	5	10,000
			.15	.25	.25	.15		.75
17	Detroit Lakes		2	5	5	2		14,000
				.25	.25	.25		.75
18	St. Joseph Area	3c		5	5	5		15,000
						.5	2	2.5
19	Platte River	3a				10	40	50,000
						.25	.25	.50
20	Salt Creek					5	5	10,000
	(western					.5	1.5	2.0
21	Missouri River S. Dak.)	3a,c				10	30	40,000

No.	Project	Section	Fiscal Years 70	71	72	73	74	Total
						.5	1	1.5
22	Floyd-Boyer-L. Sioux	3a				10	20	30,000
						.5	1	1.5
23	Clarks Fork of Yelstn.	3a				10	20	30,000
						.5	2	2.5
24	Souris River	3a				10	40	50,000
						.25	.25	.50
25	Devils Lake	3c				5	5	10,000
							1	1.0
26	Missouri River Breaks	3a					20	20,000
	Totals		4.5	10.25	12	12.5	12	
			90	195	250	261	247	

* For regional professional planning staff only. This does not include time spent in FY 1970 on Type I Framework Studies, or other special studies participated in.

BASIC PLANNING NEEDS

Integration and Cooperation

As defined earlier in the problem area identification process, there was a large scale attempt to incorporate as much as was possible the attitudes and information gained from various State agencies. The State planning agency was the starting point in this effort. It is here that the existing and future planning activities for each State emanate. At the onset of the basinwide explorations, the intent was to establish a "working" dialogue with the State planning agencies. This goal will be continuously pursued, as they have valuable information to offer.

1. These agencies are one step closer to the day-to-day goings-on in State planning matters and, particularly, they are closer to actual implementation of the plan at the local level.
2. They have a grasp of the local scene and transitions within their State boundaries.
3. They may possess the desired expertise in specific matters of program adoption and implementation, i.e., tax structures, financing, institutional arrangements, etc.
4. The State planning agencies may be in a better position to actually undertake a given study or project especially if a particular study ranks high on their work schedules and manpower has already been programmed.
5. Perhaps most important is that the kaleidoscope of planning activities cannot and should not be merely a Federal mandate

produced only by the Federal Government and imposed rather arbitrarily on the States and local communities. This technique has rarely worked in the past and will not work in matters of water quality planning. For this reason, a State planning agency must be involved in the initiation, development, and implementation of a plan. Unless the State representatives and people involved at the local scene do not become a part of the action--from beginning to end--the chances for success are minimal.

For all of the above reasons, it is to the mutual benefit of the Basin States, Federal agencies, local communities, and FWPCA that integration, coordination, and cooperation be sought and attained.

It is the intent of the Region to have each planning project exemplify a "cooperative effort." Through this approach it is hoped that each final report prepared will be in fact a State plan, a local plan, and a Federal plan.

Feedback Process

Immediate

Before each study is programmed into the FWPCA work plans, a "Plan of Study" will be prepared as part of the normal pre-planning activities. The Plan of Study will then be discussed at length with the interested and involved agencies to assure proper coordination and cooperation.

In this vein, State clearinghouses are being identified to reflect the need to recognize ongoing or proposed planning activities of various

State agencies and private concerns. According to Bureau of the Budget Circular No. A-95, they are being established in order to identify the relationship of any project to the plans or programs of local governments, particular State agencies or to statewide or areawide comprehensive plans.

With regard to the Dossier, information available through State clearinghouses will be utilized to assure that:

1. A complete knowledge of all planning matters and studies is obtained.
2. Overlapping of efforts and expenditures is eliminated.
3. Coordination and efficiency of operation are maximized.
4. Implementation will proceed in the smoothest manner possible.

The Bureau of the Budget is currently designating clearinghouses and central information reception agencies for each State. Up until now, very few State clearinghouses have been identified, but nearly all of the information agencies have been named. While the former will have to be notified of every potential and existing planning activity within State boundaries, the latter's function will be in the dissemination of information about the various plans.

Consequently, there will be maintained a concentrated effort through utilization of the State clearinghouses to be kept informed and aware of the planning studies and programs within the Region. As a part of the continuous review process, the updated information will be incorporated into this document.

Long Range

As part of the continuing FWPCA planning operation and expansion of planning activities at the State level, there should be established a continuous review process (involving State agency representatives and FWPCA) to examine and review the progress, direction, objectives, and problems of the on-going as well as the proposed planning studies. This information will again be used to periodically update and maintain the Dossier.

THE PLANNING APPROACH

Basic Planning Process

In striving to attain the highest water quality through environmental protection and enhancement, a basic planning process is employed. This is the planning "module."

In the planning module, interactions of the economic, technical, legal, political, institutional, and social base are taken into account. These factors are examined in depth within a predefined homogeneous area. The present as well as historic records of water quality are reviewed and analyzed. Every possible water use is identified and assessed. The detrimental factors that have caused water quality degradation are likewise identified. After all of the interactions and interdependencies have been reviewed, the results are compared to an existing set of water quality standards or some other acceptable code or guideline. Disparities between the recognized standards and what really exists then provide the necessary information for outlining a set of corrective measures to obtain the desired goals. This process leads to the plan of implementation which will be designed to accomplish and satisfy the goals in the most efficient manner possible.

Put in illustration form, the planning process for a given study would involve a myriad of considerations as depicted in Figure 3. The "monument for planning" thus provides the foundation for planning within the Region.

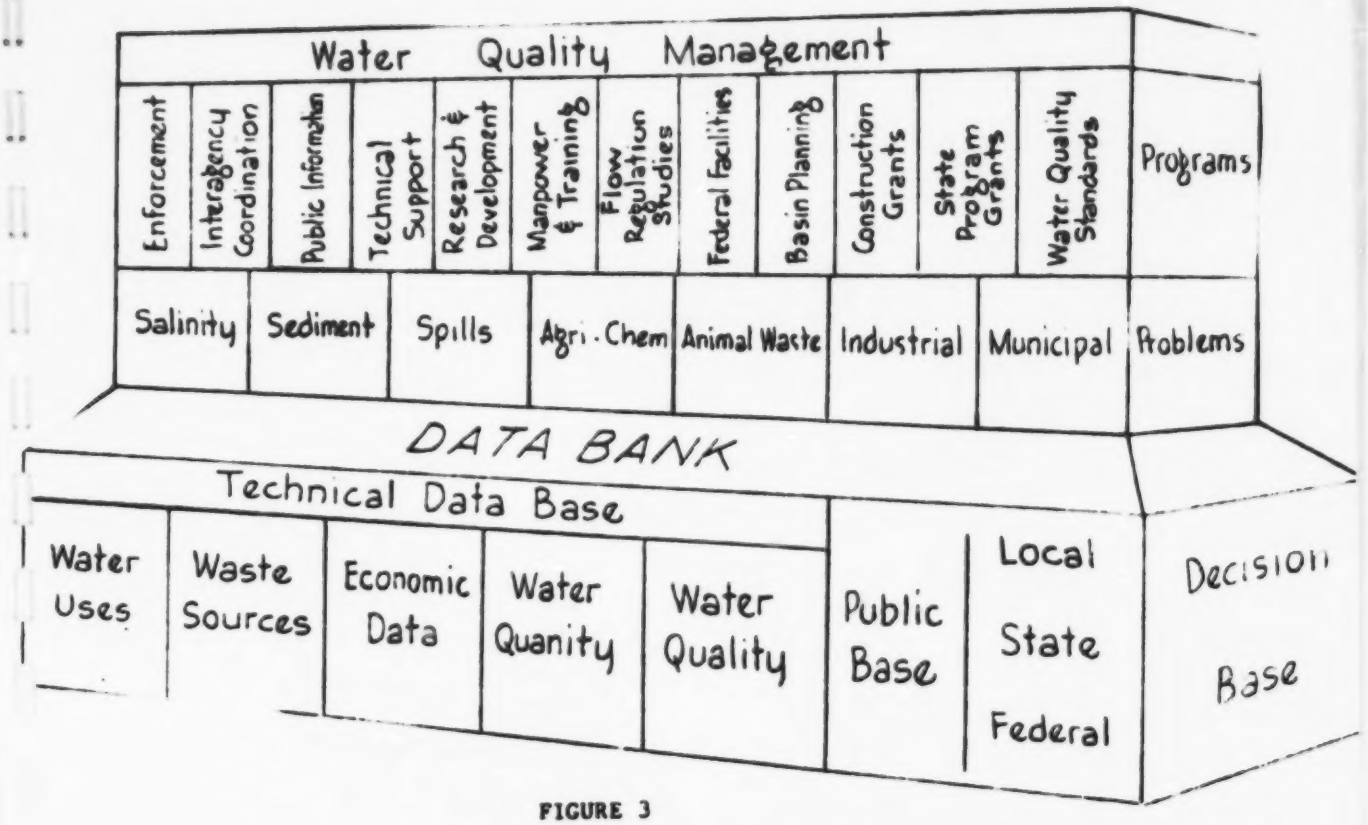


FIGURE 3

It is necessary to understand that the approach outlined herein applies to whatever planning activities that may be undertaken. Whether the plan is a Section 3(a), 3(c), or interagency study, the approach described is generally the same; the only modification concerns specific data inputs. When viewed in these terms, each type of plan becomes "one in the same."

At any rate the first step in initiating a planning effort is the development of a "plan of study." This is the "game plan" so to speak. This is where adaptations and modifications to the standard planning approach can be designed into the unique characteristics of a given area.

Consistent with this theme is the degree of comprehensiveness and flexibility reflected in the "Plan Outline", attached as Appendix I. It is obvious that certain studies will require emphasis in particular sections of the outline, whereas another study might require expansion of different sections. Although pertinent considerations for each planning project will vary, the outline shown is universal in that it will be applied to all types of regional planning studies.

APPENDIX I

PLAN OUTLINE

I. GOALS OF REPORT PLAN

A. Purpose

B. Time frame of goals - short, long range

II. SUMMARY OF FINDINGS AND RECOMMENDATIONS

III. DESCRIPTION OF STUDY AREA

A. Physical

1. Topography, climate, economy (population)

2. Hydrology

B. Water and environment in study area

1. Waters emotional impacts - historical, current, future

2. Relationship of water to one, some or all of the following at study area level

a. Economic value

b. Social environment

c. Institutional arrangements (includin, political)

d. Legal constraints (water laws)

e. Technical aspects of cleanup feasibility

IV. CURRENT WATER POLLUTION ABATEMENT ACTIVITIES

A. Local, State, Federal programs

B. Existing policies and goals at local levels

C. Proposed

V. WATER RESOURCE SUPPLY

A. Amount of surface and ground water

1. Lakes, rivers, and major drainage areas

2. General quality thereof

B. Trends that may affect short and long term planning activities

1. Artificially structured transport or confinement of water, i.e., reservoirs, holding basins, interbasin transfers

2. Short and long term estimate of surface-ground water supplies (based on current exploitation patterns)

VI. WATER USES IN STUDY AREA

A. Withdrawal and consumption (present and future)

B. In place (present and future)

C. Relative demands on surface compared to groundwater; 1980, 2000, 2020

D. Expected trends of water use

VII. EXISTING WATER QUALITY (by smallest homogeneous-hydrological area)

A. Chemical

B. Biological

C. Physical

D. Bacteriological

VIII. MAJOR POLLUTION SOURCES IN STUDY AREA

A. Definition for each pollution type: Who, what, when, where, how much

1. Domestic, rural, agricultural, municipal, industrial (manufacturing and chemical), hydroelectric, mining and organics - inorganics thereof

B. Adverse effects of pollution from/on stream uses

C. SIGNIFICANCE of pollution

D. Expected levels of water quality impairment in future years from certain uses - trends

E. Special pollution problems, i.e., nutrients, phenols, turbidity, etc.

IX. EXISTING INTERSTATE AND INTRASTATE WATER QUALITY STANDARDS FOR STATE(S) IN STUDY AREA

A. What they are - exceptions if any; possible criteria or standards needed

B. How water quality standards are being violated

C. What the implementation plan calls for

D. DELINEATION OF GAPS

E. Additional water quality standards implementation

X. NEEDS

A. Inadequacies of on-going programs

1. Federal, State, local

B. Additional water quality standards for area (beyond implementation plans)

C. Administrative

1. Legislation, interstate compacts, agreements, cooperation, coordination, advisory groups, etc.

D. Research, development, and demonstration studies, surveys, etc.

E. Special studies (for special pollution problems)

1. Advanced waste treatment, nutrient control, flow regulation, combined sewers, Federal installations, etc.

F. Information and education

1. Methods

a. Television and radio commercials, leaflets, brochures, pamphlets, personal communique, etc.

G. Additional needs

1. Additional waste treatment plants, STP operation, maintenance, water quality monitoring, etc.

XI. ECONOMIC CONSIDERATIONS

A. Cost effectiveness

1. Benefits to accrue (incremental and total)

2. Costs to obtain (incremental and total)

3. Relationship of costs to benefits

4. Alternatives and priorities

B. Relationship of costs-benefits to specific water uses

C. Financing

1. Who pays how much (Federal, State, local)

2. Time span (20 yrs., 50 yrs., 100 yrs.)

XII. PLAN OF IMPLEMENTATION

A. Findings and conclusions

B. Recommendations

1. On-going abatement programs

2. Water Quality Standards

3. Administrative

4. Research, development, demonstration, surveys

5. Special studies

6. Additional

C. Coordination of implementation plan

1. Federal, state, local

XIII. PLAN MAINTENANCE

A. Periodic updating

1. Controls

2. Feedback mechanism

B. Revision and modification